The MINING CONGRESS JOURNAL

Volume 14 AUGUST, 1928 *No.* 8

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Better Marketing and Distribution of Coal

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Mechanization Reports

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Undeveloped Mineral Resources of the South

Some Comments on this New Book

Development and Investment Guide

CORPORATION OFFICIAL, NEW YORK CITY. "In your text you have analyzed the properties, located the occurrence, described the method of extraction, and enumerated the uses of all of the minerals of the South. And in each case you have concluded with an Outlook. In this treatment you appeal to the vision of industrialists, which is the desired effect. Surely this book should be the property of every Chamber of Commerce in the South as a reference in the municipal advertising of local virtues. * * * * As for the fruits of your labor, I predict immeasurable success. You have sounded the call to progress. The answer lies with the investment trusts."

RAILROAD-INDUSTRIAL DEPARTMENT. "You should be congratulated upon the very comprehensive report as there is very valuable information contained in this publication for those interested in the development work."

PUBLIC SERVICE CO., TEXAS. "* * * * feel that it is going to be a most valuable hand book in our work."

VIRGINIA STATE GEOLOGICAL SURVEY. "Your painstaking care in getting out such an excellent reference book on the South's resources should bring to you more than perfunctory congratulations. It is certainly an excellent piece of work and will have great use by all those interested in Southern development both within and without this area."

Surprising Information

RAILROAD TRAFFIC DEPARTMENT. "This is an excellent piece of work treating on natural resources of the South. I am getting valuable information from this book and, in fact, was not aware that so many natural resources lie dormant in this southland."

ENGINEERING ASSOCIATION, NEW YORK CITY. "The book is a very welcome one, for we have also suffered from the difficulty of getting reliable general information on the South without undue searching. You have put us greatly in your debt by bringing so much scattered material into usable form."

GEOLOGY DEPARTMENT, UNIVERSITY, PA. "* * * * find that you have brought together a great deal of extremely useful information in a usable form. I am sure that I will find occasion to refer to the volume very frequently in our instructional work."

ENGINEERS—GEORGIA. "This book seems to me to have a very pertinent and timely need and I think that you and your organization are to be very strongly congratulated on the thoroughness and the extent into which you have gone."

Thorough, Complete and Accurate

RAILROAD OFFICIAL. "This very complete and comprehensive survey will be invaluable to us in our work."

DEPARTMENT OF CONSERVATION, INDIANA. "I am quite sure that this volume will be of very great aid in the development of the latent resources of the Southern States. You are to be congratulated upon having prepared a report which will not only name but also give the location of these very valuable undeveloped resources."

DIVISION OF MINERAL RESOURCES, N. C. "I have read a great deal of it already and I think it is a very comprehensive report. I have read especially where it takes up the things found in North Carolina and find it covers the principal deposits very accurately."

Readiness of Reference

DIVISION OF INDUSTRIES, STATE OF ALABAMA. "Your book on the Undeveloped Resources of the South lies on the desk before me as I write, and my opinion of its value may be judged by the fact that it is among a half dozen books of rapid, ready reference, which I find it necessary to keep within arm's length at all times. It is so well edited and written that I have found it possible to look up information while talking over the telephone and do so in a way that the listener was unaware that I was consulting a ready, rapid reference book. It is like an encyclopedia of Southern mineral conditions, and I appreciate my volume with growing interest."

GEOLOGICAL DEPARTMENT, STATE OF ARKANSAS. "This is certainly a useful method of grouping data on the mineral values of the Southern States and in taking in such a large portion of the country it should be useful in assisting the users of raw materials to find new sources. It certainly represents a great deal of work and you are to be congratulated for seeing the thing through. * * * *"

MINING ENGINEER. "The index is a master-piece. It enables one to find what he wants either by subject or locality, and is logically arranged in divisions by the method of indentations."

GEOLOGIST, U. S. GEOLOGICAL SURVEY. "* * * * makes a very fine appearance and, I am sure, will be very useful for reference purposes. I wish particularly to congratulate you on the complete bibliography and index at the end of the volume. The index is one of the best I have ever had occasion to use. * * * *"

Appreciation

CHAMBER OF COMMERCE, MISS. "The Chamber of Commerce membership appreciates very much the unselfish interest which you have taken in bringing to the attention of the country the undeveloped resources of the South.* * * *"

ENGINEERING ASSOCIATION, TENN. "The condensation of this pertinent information in such convenient form will be a real asset in itself to the South and I am sure will be a means of quickening the development of our natural resources."

CORPORATION EXECUTIVE, IOWA. "You have put in a great deal of time on the Southern mineral situation, and are entitled to the eternal thanks of the mining fraternity in general and particularly the Southern States."

Another Book

We have available a limited supply of another book by Dr. Payne, on economics. This small volume, "NATURAL RESOURCES AND NATIONAL PROBLEMS" will be sent free to anyone writing on his letterhead.

IT WAS difficult to pick out specific comments to present in this advertisement since so many different and salient points of the book are stressed in the letters quoted.

These particular letters are from Government and State authorities, railroad officials, public service companies, engineering associations and firms, corporation executives and mining engineers. Such unanimous enthusiasm in the unqualified value put upon the book and its utility is unusual from this type of men.

This volume by Dr. Henry Mace Payne lists more than one hundred metallic and non-metallic minerals, showing every known occurrence in the Southern States from Virginia to Texas. It is designed to afford the student, the consumer, the investor and the producer a ready source of information regarding the nature and extent of the deposits; how they may be identified; where additional supplies have been proven up, or areas whose surface indications warrant further prospecting; it tells what economic factors have speeded, retarded, or prevented their development; and new avenues of outlet for the product.

$5.00 a copy

THE AMERICAN MINING CONGRESS

845 MUNSEY BLDG. WASHINGTON, D. C.

A view of the low cost, high efficiency Marcus Screen Installation.

2,750,000 Tons of Coal Screened—

Maintenance and Repair Costs (1/3c Per Ton Handled) on Marcus Screens

A recent review of the Marcus Screen Installation at the No. 2 Mine of the Boone County Coal Corporation, Monclo, W. Va., brought to light operating figures that will interest every mine operator. This installation, some four years old at the time these figures were taken, handled 2,750,000 tons of coal with repair and maintenance costs over the four year period only $0.0034 per ton of coal handled, and this cost included the operating and maintenance charges on the car dumper unit, which serves these screens.

Low cost operation and maintenance are usual with RandS Equipment. Testimonials on record installations are available to all interested parties. Each unit of our manufacture is built to most exacting specification—from designs proved correct by years of test—and from the best materials suited to the peculiar conditions and severe service for which RandS Equipment is intended.

Boone County Coal Corporation, Mine No. 2, Monclo, W. Va.

A quick return on your investment is assured when you place in the hands of our engineers your problems of cleaning, handling and preparing coal—no doubt you know that "Consultation implies no obligation."

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ARMS CONCENTRATING TABLES AND SCREENS

The MINING CONGRESS JOURNAL

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COAL

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Automatic Block Signals for Mine Haulage Systems

Necessity for Use of Short Flame Explosives

METALS

The Crushing Plants of New Cornelia Copper Company

The Mining Operations of the New Cornelia Copper Company

Published Every Month by The American Mining Congress, Washington, D. C.

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Roebling

To withstand the abrasion, shocks, sudden jerks and pulls to which ropes are subjected in severe mine duty, and where equipment is purchased on the basis of lowest ultimate cost over a long period of years, experienced operators find that dependability and service dominate in

ROEBLING

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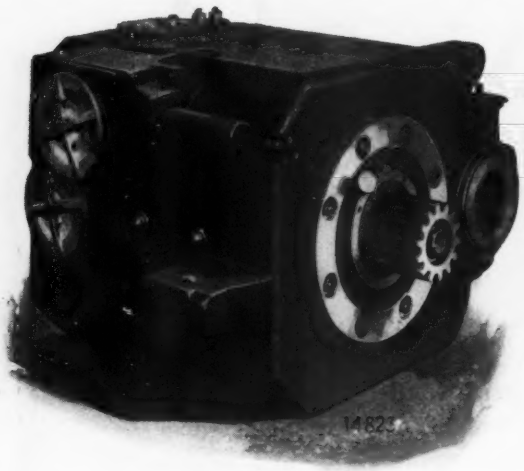
Wire Rope

John A. Roebling's Sons Company

Trenton, N. J.

Three Efficient Drives Permissible Battery

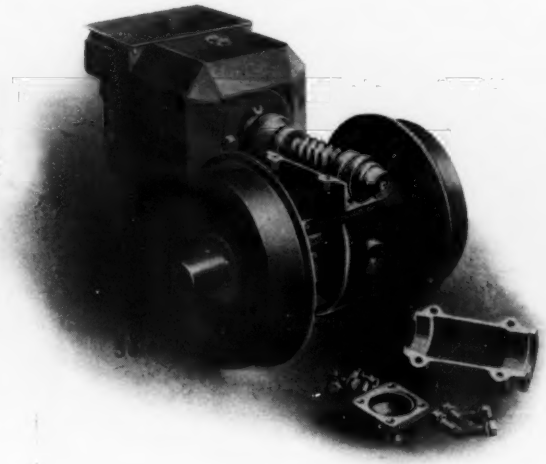


Single Spur Gear Reduction Motor

Battery locomotive drives, whether single or double reduction spur gear, or single reduction worm gear, give practically the same efficiency, provided, of course, that the size of the teeth, angles and pressures are correctly designed for their work.

For a great many years the Jeffrey Manufacturing Company has made all three drives and for each locomotive design has used the drive best suited to it.

For track gauges 35½ inches and wider, the single reduction spur gear drive is used. In these gauges there is plenty of room for large slow speed motors.



Single Worm Gear Reduction Motor

In mines where medium track is laid, double reduction spur gear motors are used. Double reduction motors are smaller, higher speed motors suitable for these medium gauges, of which 30-inch is the most common. The slight loss of mechanical efficiency occasioned by the second gear reduction is made up by the somewhat higher efficiency of the higher speed motor.

For the smaller locomotives down to 18-inch gauge, the motor is installed parallel with the track, driving the axles with a worm gear totally enclosed and running in oil. These locomotives coast with perfect ease.

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For Jeffrey Locomotives

Double Spur Gear Reduction Motor

Jeffrey Storage Battery Locomotives may be furnished either with series and parallel or progressive series parallel control. Size of locomotive and operating conditions will govern the selection of one or the other. Type of control has no practical effect on the amount of work the locomotive will do. This depends upon the capacity of the battery with which the locomotive is provided.

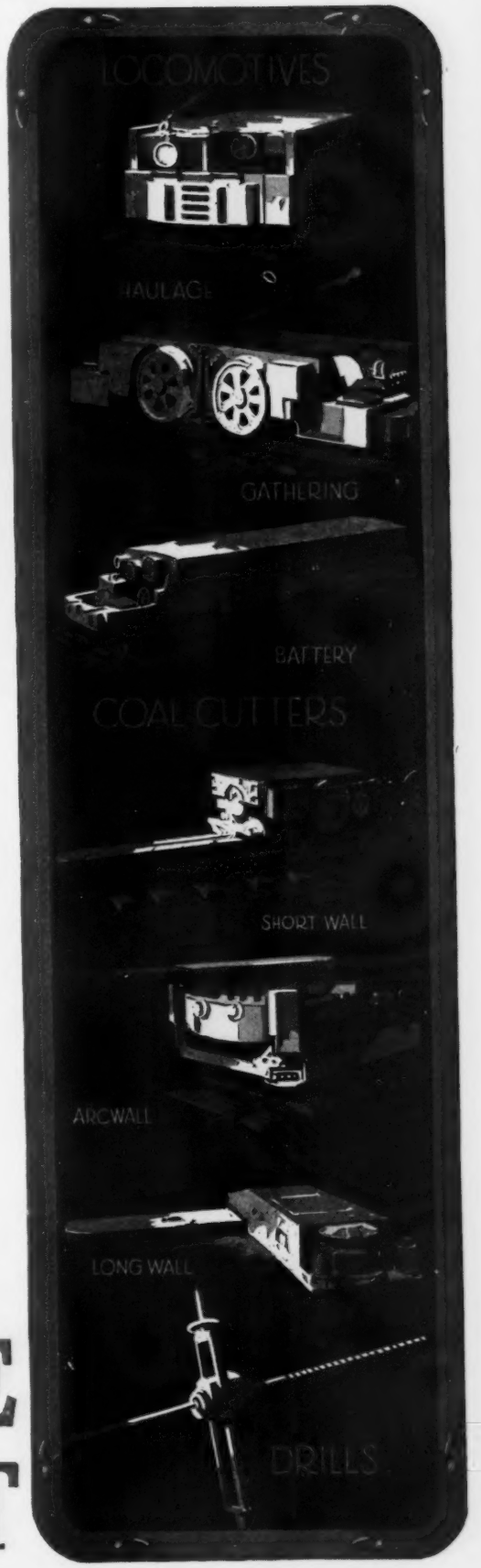
Jeffrey makes Permissible Battery Locomotives with capacities from 10 K.W. Hrs. to 120 K.W. Hrs. The most commonly used locomotive has a battery capacity of 36 to 40 K.W. Hrs.

Bulletin No. 412-B describes Jeffrey Storage Battery Locomotives in detail. A copy will be mailed to you upon request.

The Jeffrey Manufacturing Company

958-99 North Fourth St., Columbus, Ohio

Denver Charleston, W. Va. Salt Lake City Montreal, Canada
Pittsburgh, 600 Second Ave. Scranton, 122 Adams Ave. Terre Haute, Ind., 319 Cherry St.



COAL MINE EQUIPMENT

YOUR TIPPLE SELLS

The Jeffrey Manufacturing Company

958-99 North Fourth St., Columbus, Ohio

Branch Offices: New York Pittsburgh Scranton, Pa. Philadelphia Chicago Birmingham
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JEFFREY

YOUR COAL

WHEN production is heavy everywhere and coal is moving slowly, clean well-sized coal continues to get the peak prices.

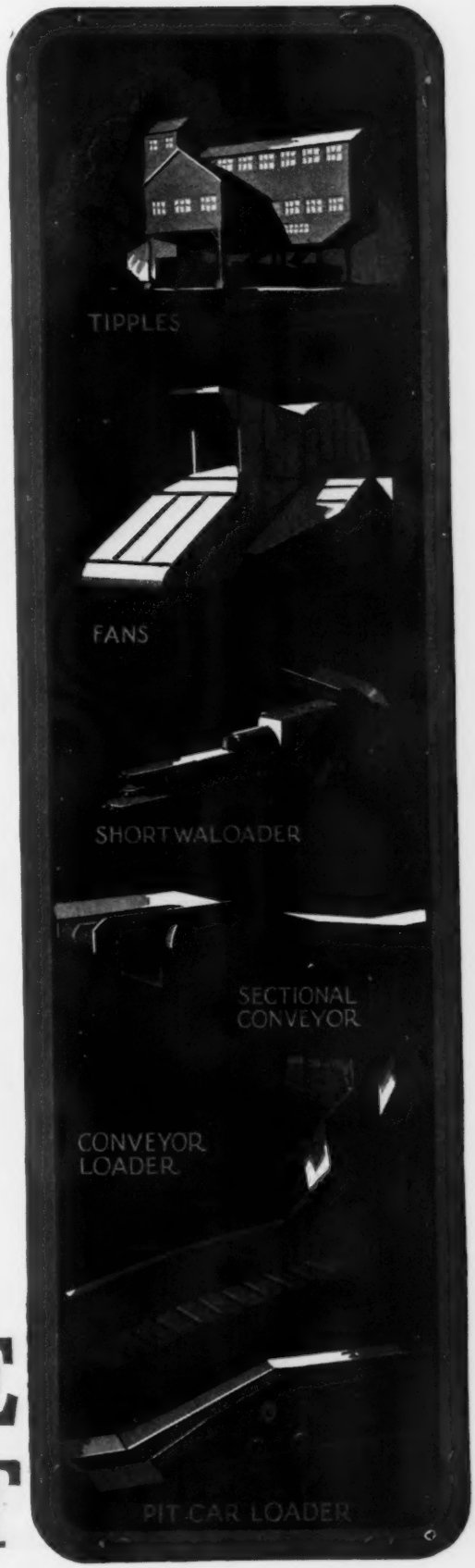
Producers of such coal have few "no bills" to hold over night.

Buyers know that correctly handled coal will have the least slack or shale. Such coal is delivered from Jeffrey-built tipples.

The Jeffrey all-steel three-boom tipple of the Premier Pocahontas Coal Co. at Premier, West Virginia, delivers all the commercial grades of coal and mixtures at any time.

The photograph shows that the coal is remarkably clean and accurately graded.

The slack is removed ahead of the picking table so that the refuse is easily seen and taken out. After the sizing a rescreening just ahead of the loading booms takes out the incidental fines.



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COAL MINE EQUIPMENT

"Plant Operations Entirely Suspended"

THE plant was only eight years old, yet all of a sudden the heating system broke down. Investigation revealed that the long horizontal runs of pipe were rusted full of holes. Followed weeks of complete shutdown while the pipe was dug up, new pipes laid, and floors and walls repaired. The loss and expense ran into thousands. Wise builders know that a factory heating system is subject to severe corrosive attack. They know that Byers Pipe resists corrosion to a remarkable degree.

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Literature on request

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Established 1864 Pittsburgh, Pa.

BYERS PIPE

GENUINE WROUGHT IRON

The place to select your new track equipment

Operators in search of efficient equipment should not fail to investigate Carnegie Copper Steel Mine Ties. The widespread and increased demand for steel ties confirms their many advantages, all of which give substantial economies. An outstanding advantage of Carnegie Ties is their copper content, which greatly prolongs their life by retarding corrosion. Recent improvements in design have increased the strength of the tie without increase in weight. Fastenings have also been redesigned.

Complete information regarding Carnegie Ties, Fastenings and Light Rails is contained in our new book—"Light Rails—Mine and Industrial Steel Cross Ties." This book should be on the desk of everyone interested in efficient track for coal mines. Copy will be gladly sent on request.

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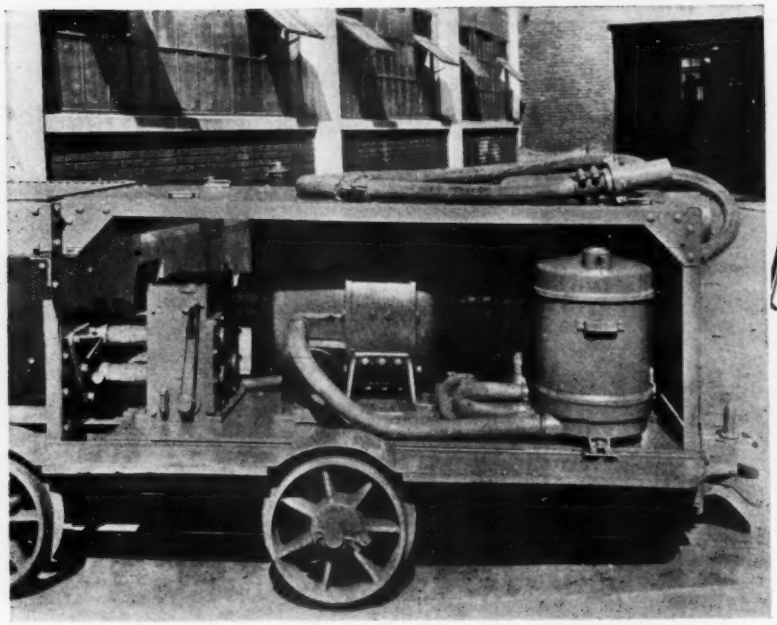

Photo courtesy Mine Safety Appliance Company

Explosion-tested Motors and Control

Protecting Mine Life and Property

WHERE gaseous or explosive coal dust conditions exist, motors for mining service should be constructed to prevent any sparks or internal explosions from igniting the surrounding gas.

Westinghouse explosion-tested Motors and Control are designed to give just such protection against the dangers of spark and flame. The motor equipment is dust-proof and dirt-proof as well—enabling it to serve a wide use both inside and outside the mine.

The High Pressure Rock Dust Distributor shown above is equipped with Westinghouse Explosion-tested Motor and Control—insuring maximum safety under the most hazardous conditions.

Trained electrical engineers who know mine applications thoroughly will be glad to show you the advantages of Westinghouse explosion-tested equipment.

Westinghouse Electric & Manufacturing Company
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Sales Offices in All Principle Cities of
the United States and Foreign Countries

Westinghouse

T 30023

Reduce the danger of roof falls —*use more light*

ALTHOUGH roof trimmers make careful inspections regularly, dangerous roof conditions are sometimes not detected because of insufficient light. Roof falls continue to occur, often resulting in serious injuries and even loss of life. To help the roof trimmer locate these dangerous conditions more light is essential.

Safety engineers approve the Carbic Flood Light

The Carbic Flood Light is particularly well suited for underground illumination. It is endorsed by every safety engineer who has seen it demonstrated.

The Cadet Model is ideal for roof trimming. It is easily carried, for it weighs only 30 pounds fully charged. It supplies a powerful light sufficient to illuminate the highest roof. Even in stopes filled with fog it gives the roof trimmer plenty of light to do a thorough job.

The Carbic Light is built for hard service. It is simple. It can be charged in 3 minutes. It has unique safety features. The Underwriters' Laboratories, Inc. list the Carbic Light as standard.

Thousands of Carbic Lights are in use above ground. For 14 years they have been supplying dependable and economical light to contractors and railroads for night work.

If your jobber cannot supply you, write our nearest office.

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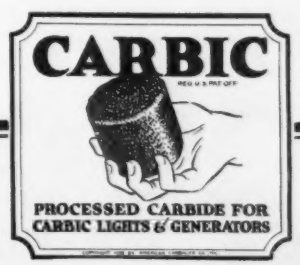
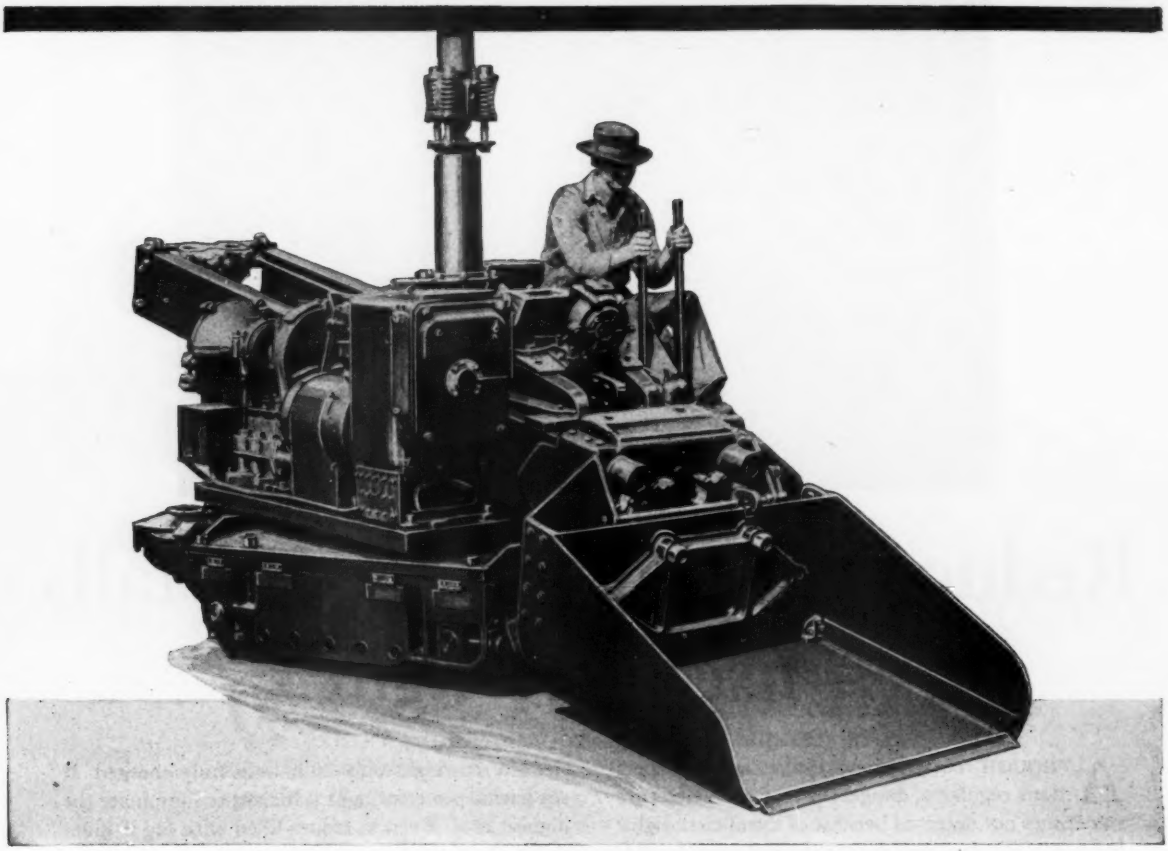
Carbic is distributed by the Union Carbide Sales Company through its national chain of warehouses and is sold by jobbers everywhere.



POWERFUL



GOODMAN ELECTRO-HYDRAULIC POWER SHOVEL

Scoop in withdrawn and lowered position, ready to pick up load.

Surprisingly Low Power Consumption

HOW it handles lumps as large as can be passed through the tipple—

HOW it "picks" down loosened coal not rolled out by the shot—

HOW it digs into a pile of coal, comes up with a half-ton load, swings to the car, discharges, and returns to the pile—all a matter only of seconds—

ALL of these features, and many others, are explained, and illustrated by mine photographs, in—

Book 270—Mailed on request
Get it—It's worth seeing

(88)

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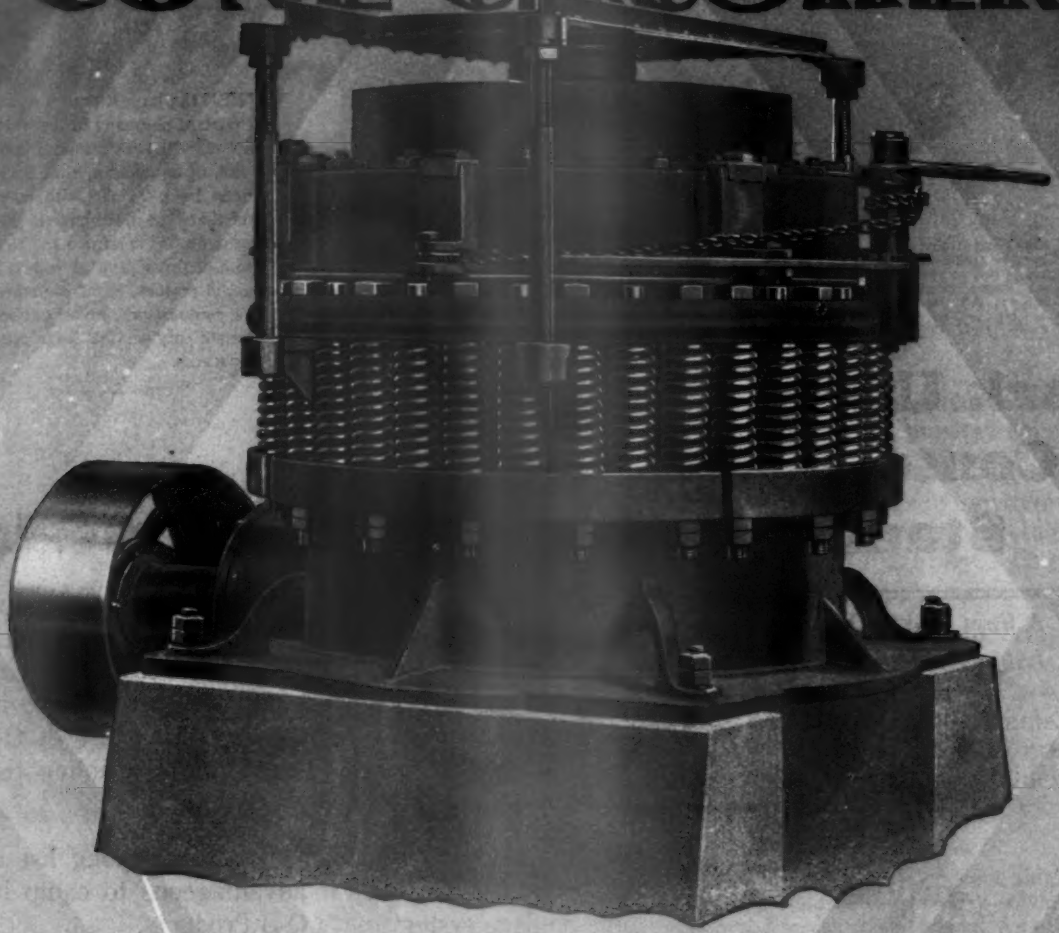
SYMONS CONE CRUSHER



MORE UNIFORMITY means more capacity of any given size.

The CONE is outstanding—because it has a greater ratio of reduction and more capacity of uniform sizes, which reduces circulating loads and recrushing of oversizes.

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N. Y.

One of the 17-car trains approaching the tipple at the Ontario portal of the Park Utah Consolidated Mines Company. All overhead line material is O-B.

WHEN the largest and most important company in a mining district standardizes on an important line of equipment, that decision must have weight with every user of that type of equipment. For no company will commit itself to a program of this character unless it has sound reasons, based on experiments, comparisons, investigations and satisfactory service from present apparatus.

Park Utah Consolidated Standardizes on O-B Line Material

A Few Major O-B Items

AW-13 Bond
For application by the Steel Metallic-Arc Process. Full information found on page 671 of the O-B Catalog No. 20. (Illustration is of one terminal only.)

Type K-3 Mine Hanger
Popular where low production costs are the aim. Complete listing found on page 491 of the O-B Catalog No. 20.

O-B Bulldog Trolley Clamp
All that could be asked for in a trolley clamp. Fully described on page 520 of the O-B Catalog No. 20.

THE Park Utah Consolidated Mines Company, Keetley, Utah has standardized on O-B Overhead Line Material. This company is steadily improving its plant and equipment that production may be increased and tonnage costs lowered. The use of O-B Overhead Line Material is a big help in enabling this property to attain its objective.

Park Utah Consolidated is but one of a long list of modern mines that finds it advantageous to equip its mine haulage systems with O-B Products.

The big blue-covered O-B Catalog No. 20 is a tremendous help to them in selecting the most suitable apparatus for specific use. It will help you too. On many occasions you will find it of utmost value when determining the line material which will best fit your specific needs. If you do not have a copy, we will gladly send one post paid.

Ohio Brass Company, Mansfield, Ohio
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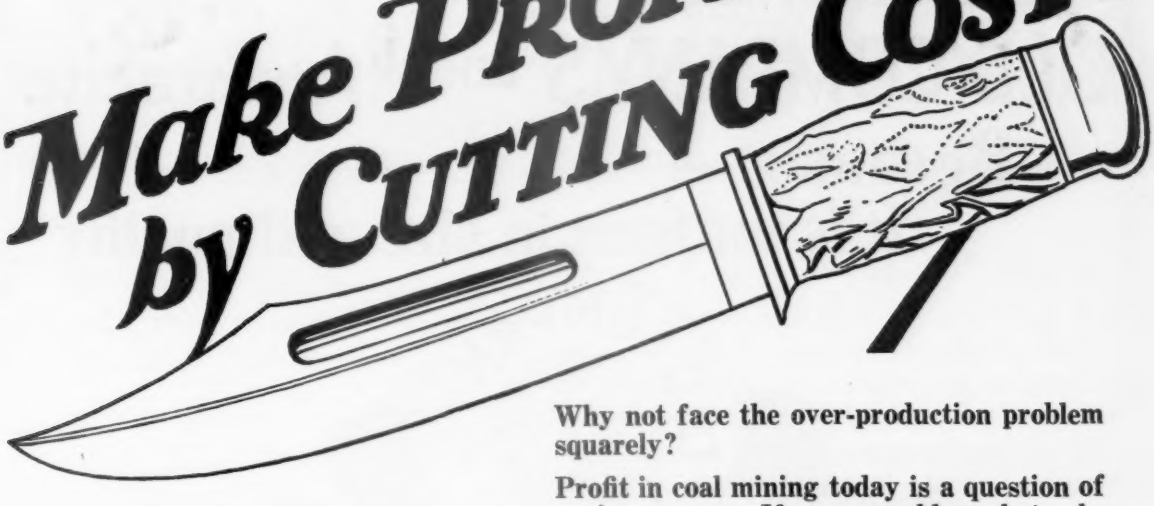
886M

Ohio Brass Co.

NEW YORK CHICAGO PHILADELPHIA PITTSBURGH ATLANTA CLEVELAND ST. LOUIS SAN FRANCISCO LOS ANGELES

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES

Make Profits by Cutting Costs



Why not face the over-production problem squarely?

Profit in coal mining today is a question of saving money. If an oversold market robs you of profits, look to your COSTS.

More than 300 successful COSCO Conveyor Systems in American coal mines are saving money every day for the operators. One operator is now using 47.

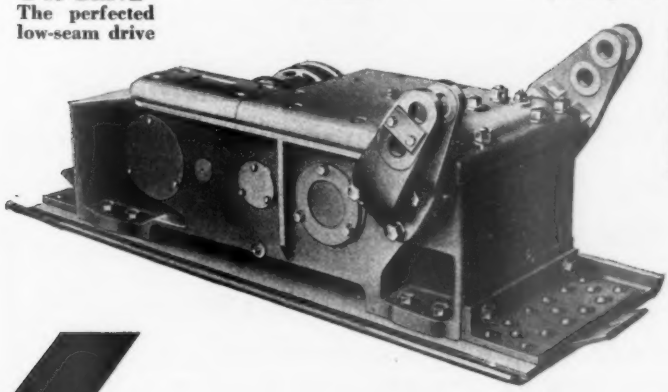
The COSCO Shaker Conveyor is built from American materials, to American standards, for American conditions. Its first cost is low. It costs less to maintain than other systems. It is a consistent producer. Its savings are amazing. It operates successfully under conditions impossible for any other mechanical conveyor system.

The COSCO A-20 and B-15 Drives and troughing, equipped with improved flanged rollers have solved the coal-handling problem for hundreds of American mines. Our experience and specialization in this field equips us to suggest the best system for your particular requirements.

COSCO

Shaker CONVEYOR

COSCO B-15 DRIVE The perfected low-seam drive



If you have a cost problem, a production problem or a man problem in your mines, write us. We'll gladly submit facts, figures and convincing proof of how COSCO Shaker Conveyors can help to solve it.

CONVEYOR SALES CO., INC.
299 Broadway, New York

"Convey Your Coal the Cosco Way"

DEALER PROFITS LIE IN PERMANENT CONSUMER PATRONAGE

Consumers Like OLD COMPANY'S LEHIGH Anthracite Because —

It is uniform in size and quality

WHEN a consumer orders "Old Company's Lehigh —same as last", the coal he gets actually *is* "same as last". Furthermore, Old Company's Lehigh is still being mined from the very same vein that furnished this good coal to the consumer's father and his grandfather.

The uniform sizing and freedom from impurities in Old Company's Lehigh is, of course, the result of unusually careful preparation and inspection at the mine.

To the consumer, it means reliability and no disappointments.

To the dealer, it means satisfied, permanently-sold customers, who make the most profitable patronage.

THE LEHIGH COAL AND NAVIGATION COMPANY
1421 CHESTNUT STREET ∿ PHILADELPHIA, PA.
New York ∿ Boston ∿ Buffalo ∿ Springfield, Mass.

CHANGING THE MINDS OF COAL OPERATORS

LIKE everybody else, when coal operators reach definite conclusions through long experience, they want to stick to them. Most people hate to change their minds.

Some operators believe, because of repeated trials, that Permissible Explosives are too strong or too expensive for use in their mines. But while they were learning this, Hercoal-F did not exist. There was nothing like it on the market. It is a new type of Permissible with about the same strength as Black or Pellet Powder, and it costs no more for an equal volume.

Hercoal-F makes very little smoke; its fumes and water-resisting qualities are superior to those of Black or Pellet Powder; it produces good lump. It combines the safety of a Permissible Explosive with the heaving action and low cost of Black Powder.

Write for complete information and prices.

HERCULES POWDER COMPANY
(INCORPORATED)

Sales Offices: Allentown, Pa., Birmingham, Buffalo, Chattanooga, Chicago, Denver, Duluth, Hazleton, Pa., Huntington, W.Va., Joplin, Mo., Los Angeles, Louisville, New York City, Norristown, Pa., Pittsburg, Kan., Pittsburgh, Pottsville, Pa., St. Louis, Salt Lake City, San Francisco, Wilkes-Barre, Wilmington, Del.

Hercules Powder Company, Inc.,
934 King Street, Wilmington, Delaware.
Please send me booklet describing Hercoal-F.

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Company .....

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HERCOAL-F

COUNT:
About 500 Cartridges (1¼" x 8") per 100 lbs.

COMPARED WITH BLASTING OR PELLET POWDER:

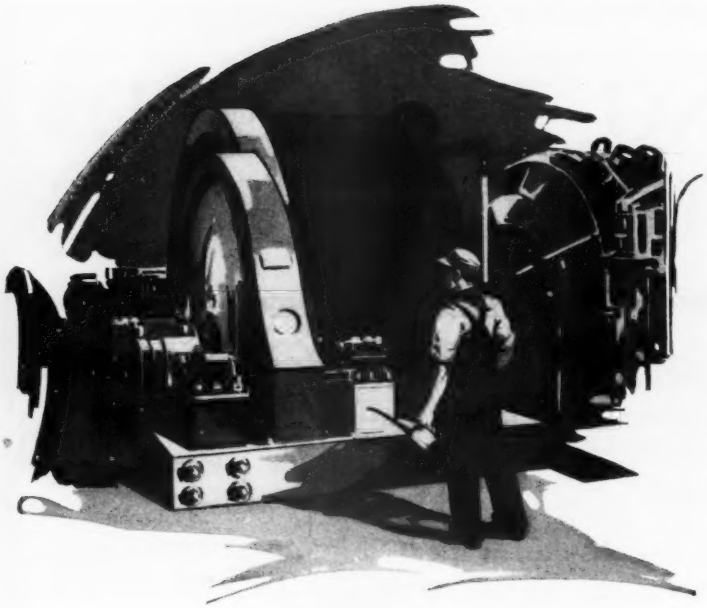
STRENGTH
—the same

FUMES
—much better

COST
—no more

SAFETY
—Hercoal-F is a permissible explosive.

1437



Correct Lubrication *is Essential*

Lubrication is no less a tool of production than the highest priced machine in your plant, and the selection of lubricants deserves equally careful consideration.

Frequently, to obtain proper lubrication, a careful investigation by experts is necessary. The Standard Technical Staff, working for years between our refineries and varied industries, has become expert in solving lubrication problems and has developed a full line of efficient lubricants for practically every industrial need.

Are you feeding your machines the right lubricating diet?

MOST mining men today realize the injurious effect to equipment that results from neglected lubrication. Equally dangerous it is to feed a machine the wrong grade of lubricant.

Proper lubrication is one of the most important maintenance problems in mining today. A lubricant that is correct for one unit of equipment may be wholly incorrect for another. It was the knowledge of this fact that had much to do with building up the complete lubrication service which the Standard Oil Company (Indiana) offers the mining industry.

Standard Oils and Greases include every lubricant that a mine requires. And to make sure that the correct lubricant is supplied to each bearing or moving part this company offers a staff of engineers who have a broad and thorough knowledge of lubrication problems.

Upon request, we will gladly have one of our engineers visit your plant, analyze the lubrication requirements of each machine and give you the benefit of his recommendations. This service places you under no obligation to us.

Get in touch with our nearest branch office.

STANDARD OIL COMPANY *(Indiana)*

General Offices: 910 S. Michigan Ave. CHICAGO, ILLINOIS

ILLINOIS	INDIANA	IOWA	S. DAKOTA	N. DAKOTA	MINNESOTA	MISSOURI
Chicago	Evansville	Davenport	Huron	Fargo	Duluth	Kansas City
Decatur	Indianapolis	Des Moines	MICHIGAN	Minot	Mankato	St. Joseph
Joliet	South Bend	Mason City	Detroit	WISCONSIN	Minneapolis	St. Louis
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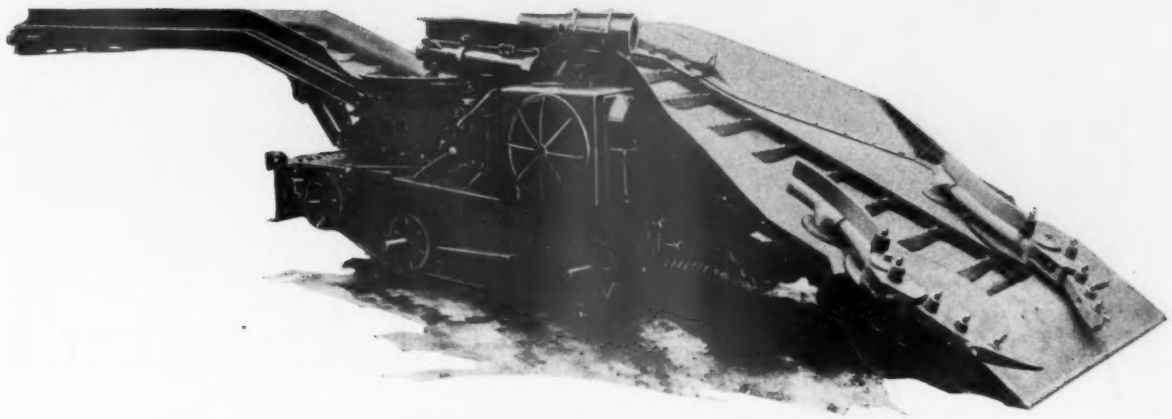
1538

Low Cost Coal with JOY'S!



IMPROVED TYPE 5 BU JOY LOADER

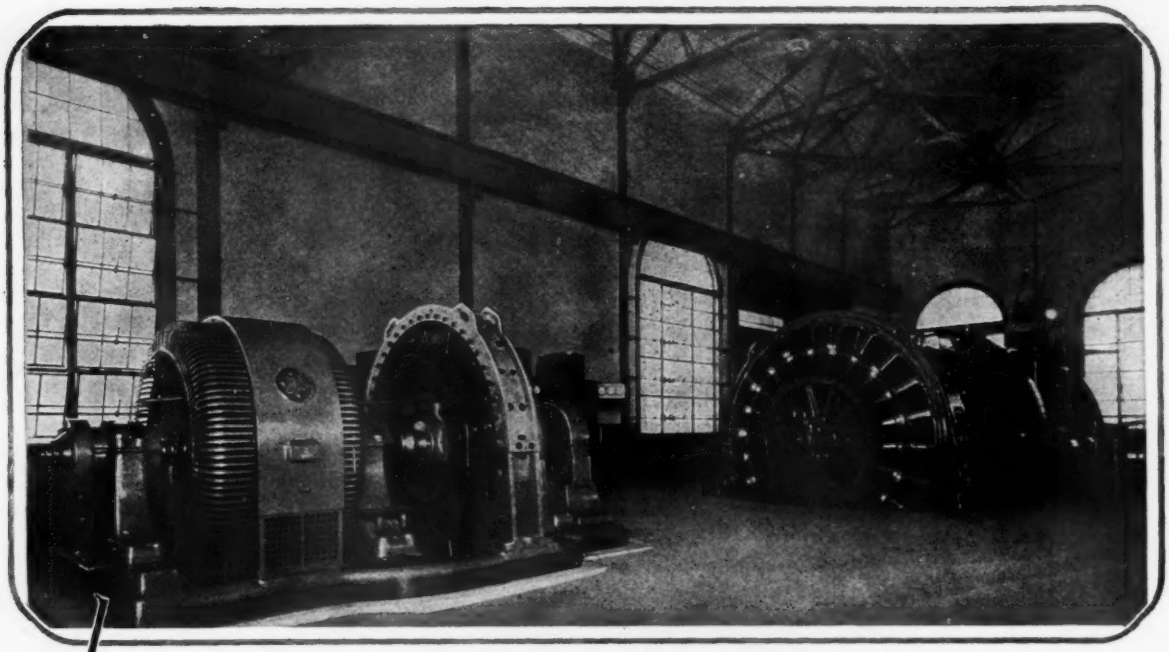
Our Improved Machines are producing low cost tonnage for fifty different companies, operating in ten coal producing states. These installations range in size from the single unit of the new user to batteries of eighteen and twenty Joy Machines for mines producing their entire output mechanically; while modernization programs for some of our customers call for the installation of twenty to twenty-five additional Joy units per mine, before January 1, 1929.

Our trained and experienced organization is available for preliminary discussions, mine examinations and final estimates of tonnage productions and costs with our units, under conditions determined by each property; while our demonstrating and service departments assure complete instruction of all operating crews, and close cooperation between the user and manufacturer for all required service.

Detailed Information Will Be Forwarded Upon Request

Joy Manufacturing Company

Franklin, Penna.



The Mighty Hoists of Anaconda
at Belmont and Badger

Greatly increased depth demanded electrification. Last year the hoists at these famous mines were changed over from steam and are now operating with complete success on regular production schedules.

Both of these 2150-hp. hoists are completely G-E equipped. They handle seven tons of ore per trip at a speed of 2250 ft. per min. and are designed to operate from a depth of one mile.

The Ward Leonard system of control, with synchronous motor-generator sets, insures flexibility, better voltage regulation, reliability, safety, high efficiency, and low maintenance.

Complete electric equipment for every phase of mining is supplied by General Electric. Information and the advice of specialists are available through your nearest G-E office.

Apply the proper G-E motor and the correct G-E controller to a specific task, following the recommendations of G-E specialists in electric drive, and you have G-E Motorized Power. Built in or otherwise connected to all types of industrial machines, G-E Motorized Power provides lasting assurance that you have purchased the best.

Motorized Power
–fitted to every need

200-163

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Better Explosives For Less Money

THE new series of Explosives—*Hercomites 2 to 7*—are replacing the old Extra Grades and Extra Gelatins, because they often do better work at less cost.

The table below shows the Extras and Gelatins that the *Hercomites* replace at a saving:

HERCOMITE 2 is nearest grade to	60% Extra L. F. or 40% to 50% Gelatins
HERCOMITE 3 is nearest grade to	50% Extra L. F. or 30% to 35% Gelatins
HERCOMITE 4 is nearest grade to	40% Extra L. F. or 25% to 30% Gelatins
HERCOMITE 5 is nearest grade to	30% Extra L. F.
HERCOMITE 6 is nearest grade to	25% Extra L. F.
HERCOMITE 7 is nearest grade to	20% Extra L. F.

Some of the advantages of the *Hercomites:*

1. Safest type of commercial explosives manufactured.
2. Fumes are better than the Extras and compare favorably with the Gelatins.
3. Number of 1¼" x 8" cartridges runs from approximately 240 for *Hercomite 2* to 350 for *Hercomite 7*.
4. Cost per cartridge is lower.
5. Blasting costs are reduced 10% to 30%, where suitable.

The *Hercomites* represent a distinct forward step in the manufacture of explosives. They are suitable for a wide range of work, and we recommend their consideration to the explosives consuming industries. Descriptive booklet and prices gladly furnished on request.

HERCULES POWDER COMPANY

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Sales Offices: Allentown, Pa., Birmingham, Buffalo, Chattanooga, Chicago, Denver, Duluth, Hazleton, Pa., Huntington, W. Va., Joplin, Mo., Los Angeles, Louisville, New York City, Norristown, Pa., Pittsburg, Kan., Pittsburgh, Pottsville, Pa., St. Louis, Salt Lake City, San Francisco, Wilkes-Barre, Wilmington, Del.

Hercules Powder Company, Inc.,
934 King Street, Wilmington, Delaware

Please send me additional information regarding the new Hercomites, 2 to 7.

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Company _____

Street _____ City _____ State _____

1523

DOOR IN GOLD MINE OF HOMESTAKE MINING CO., LEAD, S. D.

CONTROL VENTILATION
AND
SPEED UP HAULAGE

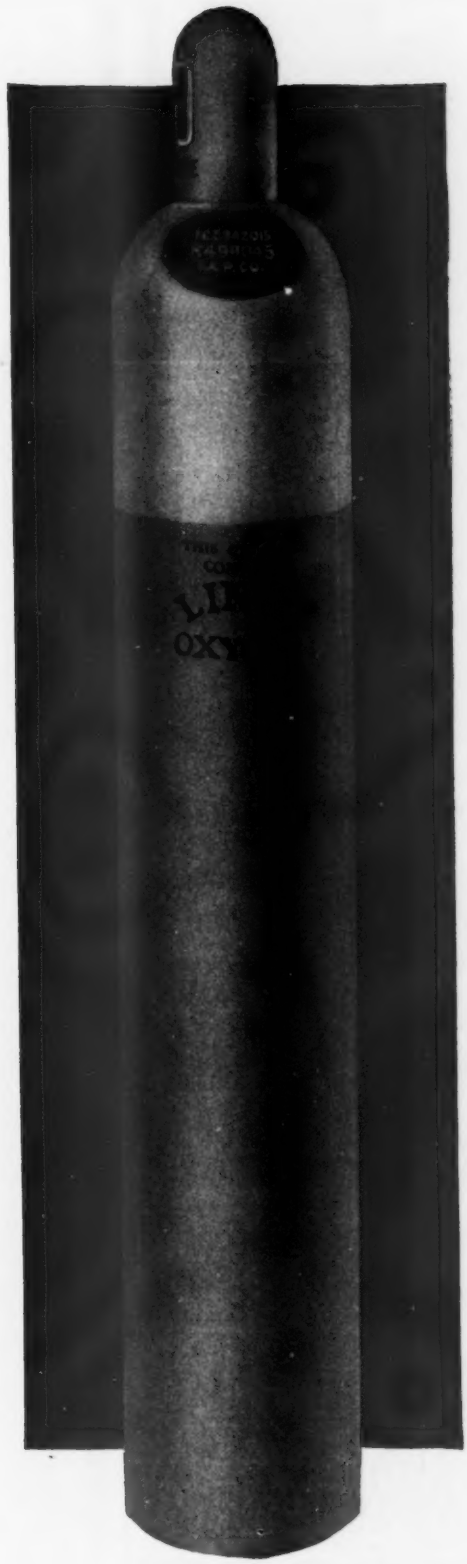
CANTON AUTOMATIC MINE DOORS hold the air and divert it as desired. They open and close quickly and positively. Reversing the air has no effect on the doors or their operation. In a case of fire they are

WORTH THEIR WEIGHT IN GOLD

When used in conjunction with CANTON AUTOMATIC SIGNALS and AUTOMATIC SWITCH THROWERS they eliminate all delays and release for other work all persons employed at flagging, trapping and switch throwing. Our catalog is worth asking for. Let us send it to you.

THIS EQUIPMENT WILL PAY FOR ITSELF if given a chance. Write today. 5,000 in use in GOLD, COAL, SALT, GYPSUM and other mines.

The American Mine Door Co.
2063 DUEBER AVE. CANTON, OHIO



It isn't in the written contract

When you buy Linde Oxygen, you get not only a high grade product, the standard for more than 20 years.

And fast delivery service from the nearest of 50 plants and 102 warehouses.

But also Linde Process Service, always ready to help you get the best results in the most economical way.

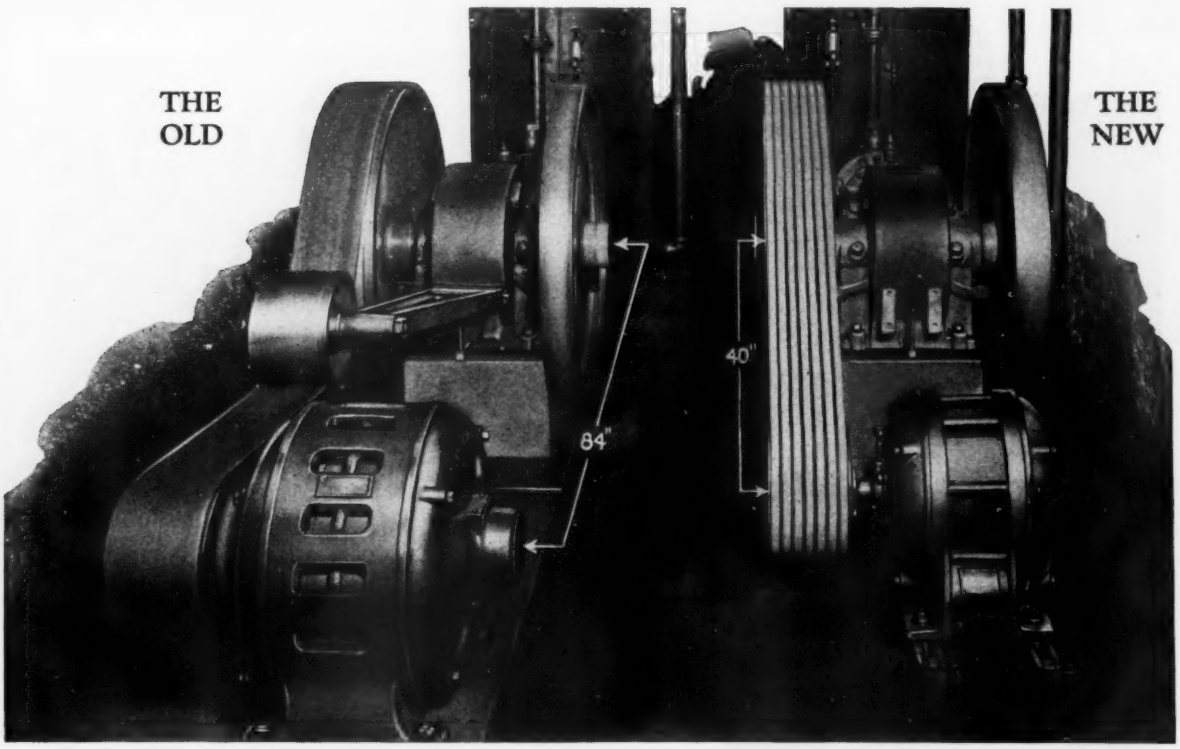
It isn't in the contract, but it goes with every cylinder.

THE LINDE AIR PRODUCTS CO.
Unit of Union Carbide and Carbon Corporation

50 PLANTS UCC 102 WAREHOUSES

General Offices: Carbide and Carbon Building
30 East 42d Street, New York

LINDE OXYGEN



Less Space— Lower Losses— Less Maintenance

Duplicate Compressors, operating at same capacity and pressure.

THE NEW UNIT EMPLOYING TEXROPE ELIMINATES THE IDLER.

The 40″ pulley centers on the new unit is less than one-half of this dimension on the flat belt driven unit.

The short belt centers made possible by Texrope Drive and the compactness of the Allis-Chalmers motor with Timken Bearings result in a big saving in floor space.

The Texrope requires no lubrication; dust does not affect it. The motor is made largely of steel—indestructible rotor—extra sealed insulation—grease packed bearings which require attention only a few times yearly. These features reduce maintenance to a negligible item.

ALLIS-CHALMERS MANUFACTURING CO.
MILWAUKEE
District Offices in Principal Cities

ALLIS-CHALMERS MOTORS *and* TEXROPE DRIVE

A Combination Unequalled!

Can we supply

Prest-O-Lite
DISSOLVED ACETYLENE

to Palm City, Alaska?

No, not yet, but only because there is no such place. Wherever there is oxy-acetylene welding or cutting work to be done, Prest-O-Lite can be supplied. It is readily available to every part of every state in the union.

32 plants located in the most important industrial centers produce and distribute Prest-O-Lite. In addition, a national chain of 102 warehouses supplies Prest-O-Lite to even the smallest dots on the map.

No matter where you are, Prest-O-Lite is near at hand.

THE PREST-O-LITE COMPANY, INC.

Unit of Union Carbide UCC *and Carbon Corporation*

General Offices: Carbide and Carbon Building

30 East 42d St., New York

32 Plants—102 Warehouses

When time-sheets become nightmares

DU PONT GELATIN DYNAMITE

will get you back on schedule

WITH your engineering skill and practical experience combined with the performance of du Pont Gelatin, you have the means for solution of many of those problems encountered in ore mining. The extensive use of du Pont Gelatin and its efficiency under so many conditions are convincing evidence that du Pont Gelatin is capable of rendering a similar service for you.

Here are the outstanding features which emphasize the value of du Pont Gelatin:

High-water resistance: In tunneling where water literally pours down on the workmen, du Pont Gelatin stays in the bore holes and explodes completely.

Plasticity: Du Pont Gelatin dynamite, because of its plasticity, can be loaded in uppers whose bore holes are oblique or vertical.

Sensitivity with safety: One of the most dangerous conditions that occurs in tunneling and metal mining is having unexploded dynamite in the bore hole—the explosive not being sufficiently sensitive. Du Pont Gelatin dynamite is noted for its complete detonation.

Minimum of noxious fumes: Dangerous fumes have always been among the difficulties encountered in the use of explosives underground. Practical explosives users have collaborated with our laboratory chemists in developing a balanced formula insuring the maximum

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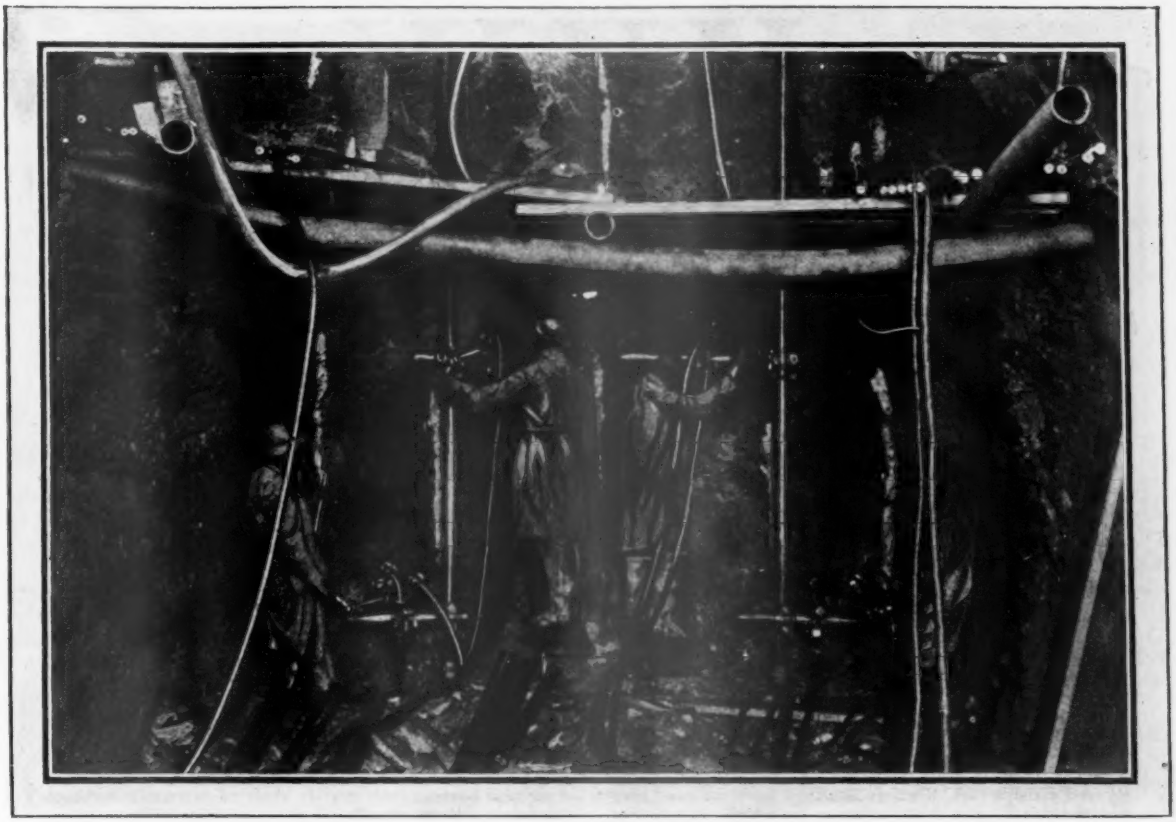

strength and minimum fumes of du Pont Gelatin. The Shandaken Tunnel in New York State, for instance, was completed with du Pont Gelatin without any complaints as to fumes, plasticity or execution.

* * *

Du Pont Gelatin dynamites are used today in tunnel driving everywhere. They are adapted to ore mining, quarrying, and to those difficult operations where other types of explosives would prove to be inefficient. Nor is du Pont Gelatin merely an emergency explosive—it is one of the most economical and dependable explosives to employ wherever they are required.

Don't be satisfied with *any* gelatin dynamite. There is a lot of difference among "gelatins." The du Pont oval trade-mark on the cartridge of du Pont Gelatin dynamite means better fumes, better performance, greater uniformity, more sensitivity, greater safety, and more all-around dependability.

Kinds of du Pont Gelatin Dynamites

Du Pont Gelatin 20% to 75%:
Dense, waterproof and plastic. Minimum of noxious fumes. When properly confined these gelatin dynamites are about 10% quicker in their action than the corresponding grades of straight dynamite. Low-freezing.

Du Pont Special Gelatin 35% to 90%:
Similar in most respects to du Pont Gelatin except that it is not quite so water-resisting and not adapted for very wet work, such as submarine work. Its fumes have a different flavor from du Pont Gelatin, but are no more obnoxious.

Quarry Gelatin 40% to 75%:
For open work where fumes are not so important. Additional strength gained by the sacrifice of fume quality. Must not be used underground. Otherwise has the same qualities as the above.

Blasting Gelatin:
Strongest and quickest explosive in existence. Best fumes. Absolutely waterproof. Instead of being plastic, it has a texture like pure para rubber. *Not* low-freezing. Adapted to special cases of tunnel driving, shaft sinking, deep well shooting and submarine work.

E. I. DU PONT DE NEMOURS & CO., Inc., *Explosives Department*, Wilmington, Del.

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WHY TIMKENS SWEEP ON

THE WAY in which Timken Bearings have swept into dominance in so many types of industrial equipment has become the talk of all Industry. So radically and so rapidly have previous ideas of bearing performance been revolutionized by Timken Tapered Roller Bearings that the mechanical reasons which made this performance possible are sometimes lost sight of:

RADIAL LOADS AND THRUST LOADS Because of their tapered construction, Timken Bearings carry without compromise radial loads, thrust loads, or both loads in any combination, making possible more simple, compact, effective, wear-proof, and rigid mountings.

GREATER LOAD AREA Timkens are line contact bearings. Size for size, they have a greater capacity because the loads are distributed on the entire length of the rolls, cup and cone, instead of being concentrated on a very small area.

POSITIVELY ALIGNED ROLLS The design of the Timken Bearing provides for full contact along the entire length of the roll, cone and cup. The rolls are positively aligned to the axis of the cone and cup, thus allowing the bearing to function continuously at its full extra capacity.

WEAR-PROOF The longer life of Timken Bearings and their greater resistance to wear is made possible because the loads are distributed over the entire length of the rolls, cone and cup; because of the fact that radial, thrust and combination loads are provided for; because of the special analysis electric furnace Timken steel; because the parts are case hardened to give them a glass-hard outer surface with a tough elastic inner core; and because each part is made to extremely accurate dimensions. Even after hundreds of millions of revolutions, wear in a Timken Bearing is so slight as to be practically imperceptible even when measured by delicate instruments.

A PRECISION PRODUCT So accurately and precisely made is the Timken Bearing that it has become the universal standard on machine tool spindles, where a few years ago such accuracy was thought beyond attainment.

FRICTIONLESS The Timken Bearing is practically 100% frictionless: The higher load capacity and greater wear resistance of tapered line contact are thus obtained at an insignificant power loss almost impossible to calculate.

TAKE-UP IN ASSEMBLY The take-up feature in the Timken Bearing is a great advantage in assembly. Manufacturers find this to be of tremendous benefit, as it allows for minor machine irregularities, the locating of gears, etc. Last but not least, since slight wear is inevitable in any machine that revolves—(regardless of any statements to the contrary)—the Timken Bearing is designed for this take-up without affecting the proper operation of the bearing.

Revolutionizing operating and maintenance costs and stepping up production, they have brought a new day of manufacturing economies. Machine performance, never before thought possible, is now an accomplished fact. Timken dominance was inevitable. Timkens are sweeping on—wherever wheels and shafts turn.

TIMKEN *Tapered Roller* **BEARINGS**

The
MINING CONGRESS JOURNAL
**A Monthly Magazine—The Spokesman For The Mining Industry—
Published By The American Mining Congress**

VOLUME 14 AUGUST, 1928 No. 8

Editorials

Mine Depreciation

THE Commissioner of Internal Revenue has authorized a comprehensive study of depreciation in the mining industry. The announced purpose of the study is to determine flexible standards of depreciation. The plan is to determine average rates of depreciation which will be accepted by the Commissioner without substantiation and without adjustment, and to require substantiation in proportion to the departure of the rates used from such average rates. The announcement made by the Commissioner's office expressly states that it is not their purpose to establish rates from which no deviation will be permitted.

The provisions of law governing the determination of depreciation have been substantially the same since 1917, except that in the 1924 Revenue Act it was provided that the basis in the case of property acquired prior to March 1, 1913, should be cost or March 1, 1913, value of the property, whichever is greater.

Practically all tax cases involving questions of depreciation in the mining industry have been settled; and, there being no change in the law requiring a change in the administrative methods or practices of the Bureau, it is a question whether the proposed study would not disturb a situation that so far as the mining industry is concerned seems entirely satisfactory.

The memorandum issued by the Commissioner's office states that the results which are anticipated from studies of depreciation and maintenance are: "Greater equity in the collection of income taxes imposed by the several revenue acts, and simplification of the preparation and audit of tax returns with consequent saving of material amounts both to the taxpayers and to the Government."

"Greater equity in tax collection" apparently means that the depreciation allowances will be adjusted upon a common level as between different taxpayers in the mining industry; that is, if the proposed study shall disclose the fact that one taxpayer is receiving a higher rate of depreciation on similar equipment than another taxpayer, either the depreciation rate of the former will be reduced to the rate allowed the latter, or, the rate of the latter will be raised to the rate allowed the former, or, the rates of both will be placed somewhere in between by the lowering of one and the raising of the other. If the phrase "greater equity in tax collection" means anything else, it is not indicated by the Bureau's memorandum.

This leads to consideration of the fact that conditions are widely different in different branches of the mining industry, in different districts of the same branch of the industry, and in different mines in the same district; so that a schedule of standard rates upon particular classes or items of plant and equipment, that might be fair in the determination of depreciation allowances for one mine, would be wholly inapplicable to another; and it does not seem possible to set up a schedule of flexible rates with minimum and maximum limits that could be given general application to any branch of the industry.

In the case of short-life mines the depreciation deduction has little or no relation to wear-and-tear, but is simply an amortization of plant-and-equipment cost on the basis of ore reserves and production. Since conditions vary widely as between different properties, the lives of which may be from one to twenty years, the yearly rate of depreciation may bear no relation at all to the possible life of the equipment from an ordinary wear-and-tear standpoint.

The foregoing and other considerations have been presented to officials of the Bureau of Internal Revenue by representatives of The American Mining Congress, appearing on behalf of the mining industry, and the organization has again recommended that the proposed study be abandoned in so far as the mining industry is concerned, in accordance with a resolution adopted by its annual convention in December, 1926.

Mining on the Political Platform

BOTH the Republican and the Democratic platforms have included a plank on the coal industry. Both have gone on record as favoring some legislation that will permit the industry to function in a more economic manner. Each has based its plank upon the recent Senatorial investigation. The Democratic platform expresses itself in high-sounding terms, declaring that "* * * demands constructive legislation that will allow capital and labor a fair share of prosperity with adequate protection to the consuming public." The Republicans are equally enlightening, "* * * to assist in any feasible plan for the stabilization of the coal mining industry which will work with justice to the miners, consumers and producers."

These declarations are typically political and mean little. In our own humble estimation the coal industry will have so far progressed in the settling of its difficulties prior to the November elections, and the convening of Congress in December, that only the echo of a political promise will remain.

We again insist that the coal industry, as well as all other industry, is better equipped to settle its internal problems than any Congressman, any group of Congressmen, or any political party can ever hope to be. Give the industry time, and gigantic as it is, it will right itself, and continue, as it has for the last century, to give industry and the people of this country the cheapest fuel and power known in the history of the world.

The Political Program of Communism

ON MAY 27, a communist group of 296 delegates from every section of the country, including 25 Negroes, 10 farmers, and many women, announced the nomination of candidates for President and Vice President.

The Communist Party, according to *"The Daily Worker,"* declares itself as the deadly enemy of capitalism. It denounces the Republican Party as representing big business, and the Democratic Party for perpetrating peonage and maintaining wage slavery.

Among the planks in its platform are the abolition of the Supreme Court, the release of all political prisoners, removal of the veto power of the President, recognition of Soviet Russia, abolition of all laws against miscegenation, a universal five-day week, repeal of all immigration laws, franchise for all above 18 years of age, Federal sickness, accident and unemployment insurance, municipal control of rents which must not exceed 10 percent of the worker's wages, exemption from taxation of all kinds for all wage-earners, and cancelation of all war debts, with a five-year moratorium on farm mortgages.

Their nominee for President is William Z. Foster, expelled from the Socialist Party in 1918, and a leader in the "boring from within" policy of the I. W. W.

Benjamin Gitlow, named as nominee for Vice President, is an ex-convict whose citizenship has been forfeited for his crime of criminal anarchy.

It is stated that four years ago the Communist party polled 36,386 votes, in 15 states, no votes being cast in the remaining 33 states, for their ticket.

That even 36,386 people can be found in the entire United States, subscribing to such claptrap, fol de rol, and utter impracticability, is a sad reflection on our earlier admission of the "great army of the unwashed."

It reveals a situation which can not be overlooked. There are many good and honest men and women who have entered America with the avowed purpose of becoming law-abiding citizens, educating their children and learning the English language. These we welcome. But we do not need, nor should we admit that class of people whose lives are tinged with hatred for law and order, whose hearts and brains are fertile soil for the seed of discontent and who would enshroud us in a turmoil of strange political, economic and social doctrines.

Let us lay down the principle that *admission to the United States is a privilege and not a right, and that there is no greater privilege in the world than that of American citizenship.*

Mining Under Red Rule

JUST how this Red doctrine really functions is evidenced by the reports that are emanating from their official stronghold, Russia. Recent reports on industry in that country indicate a steady decrease in production in spite of a vast increase in the number employed. *The Wall Street Journal* recently presented figures from authentic sources showing that "the output of the Donetz coal mines in the last fortnight was 11 percent below the estimates, notwithstanding the removal of 'destructive engineers' and the employment of 3,000 additional miners."

America has demonstrated that only by mass production, which means machinery and skilled labor, can a nation keep ahead and prosper. Russia has gone back to the theory of "ten thousand men with teaspoons" to dig a ton of coal. Employment, contented workers, a prosperous nation, state, community, company and individual is not brought about through individual employment in great numbers, but in volume of production, which leads to new industries, new conceptions of living, and prosperous peoples.

The Tariff On Minerals

SECRETARY OF LABOR James J. Davis recently said: "Prosperity depends on the tariff," and, "If they tamper with the tariff, they tamper with the pay envelope." Anyone who questions this viewpoint has only to look at the domestic industries that are adequately protected by the tariff, consider the wages paid, and the continuous employment of labor, and then turn to those few industries that are afforded no protection or only meager protection, to find the answer: "Without protection—low wages, unemployment. With adequate protection—good wages, steady employment."

Both great political parties now stand for a high protective tariff. It would appear, then, that there will be no tinkering with the tariff unless industries needing further protection come to Congress for help. If any industry needs help, Congress should not hesitate to give it. If any industry needs tariff protection, it is the duty of that industry to come to Congress and urge it in the interest of development of home industry as well as in the interest of the wage-earners who would be benefitted thereby.

In this matter one industry should not be favored over another. The producer of the raw material has as much right to a tariff as the manufacturer. As a matter of fact, if a manufacturer seeks tariff protection for himself, and then seeks to hold his raw materials on the free list at the expense of the domestic producer, Congress should treat him accordingly. Intimidation of domestic producers of raw materials in many instances has kept them from coming to Congress with a plea for protection. No worse form of business hypocrisy can be conceived of than that of one industry demanding that its production be protected by a high tariff while its raw materials shall be on the free list, more especially where an adequate domestic supply of such raw materials is known to be available, or can be developed.

It does not appear that there will be an attempt made to reduce the tariff, but there undoubtedly are instances where the present tariff rates should be raised, and the industries affected should not hesitate to come forward and ask for the increases they need.

That Margin of Profit

PROFITLESS prosperity is a term which foreshadows economies through force of industrial pressure. Domestic markets are increasing their demands without increasing their purchasing power. To meet these demands and the intense competition of increased production, American business is being transacted with a continually decreasing margin of profit. The continued existence of business requires cheaper production, which in turn requires better business direction, and the use of labor saving machinery. The adoption of mechanical methods of production, may mean the safe-guarding of the "margin of profit" necessary to any successful enterprise.

The Passing of the United Mine Workers of America

AFTER more than a year and a half of insistence upon an uneconomic wage scale, the United Mine Workers of America has announced the abandonment of the Jacksonville scale as the sole basis of wage negotiations. The decision followed a week's discussion, and leaves any district free to make an agreement that is mutually satisfactory.

The present abandonment of the Jacksonville scale was engineered by the Illinois section of the Union. For months this section has bitterly opposed the Lewis position. As far back as April, seven local unions in Illinois voted to abandon the $7.50 rate, and accept a rate which the operators could afford to pay.

Even those who have most vigorously opposed the Union will not witness this swan song without some degree of sympathy for this misguided organization. When the Union decided in March, 1927, to call out its members in support of the Jacksonville scale, they had had sufficient experience to have taught them the impossibility of upholding it. The wage scale in itself was superimposed through political pressure, and in no sense could be called an agreement between those who receive the scale and those who must pay it. It was inevitable from the start that it must fail.

The result has been just what every thoughtful coal man knew it would be. The union mines have been closed because they could not compete with non-union production. They have seen their markets lost to them, have sustained tremendous financial losses, and in trying to meet impossible demands many have gone into bankruptcy.

It is too early to forecast just what effect this action will have upon the industry. Illinois and Indiana have announced their desire to adopt the 1927 scale of $5 per day for unskilled labor. Pittsburgh, central Pennsylvania and eastern Ohio are sticking to their determination to operate on a non-union basis, and have announced that the decision of the Union in no way affects them in their wage negotiations.

This action does mean however the end of the strike in Illinois and Indiana, and it should mean the beginning of a reorganization of the bituminous coal mining industry. Unquestionably there are too many mines and too many miners in this industry. Economic pressure should now assist materially in eliminating this overproduction and over-manning of the industry if it will follow the example of the Consolidation Coal Company, in operating only those mines which are susceptible of economic continuance.

The whole situation represents a process which is painful, but which is economically and industrially necessary.

Coal's Fortunes

COMMENT in the labor press indicates that union labor generally considers the abandonment of the Jacksonville scale as the greatest defeat organized labor has suffered in this country. Whether this be true or not, it is not the principle of organized labor that has been defeated, but the man-made rule of domination or ruin as sponsored by the United Mine Workers organization.

The rule of the United Mine Workers of America in recent years has been besmirched with violence. They have left a red trail from southern Illinois, with its Herrin, through West Virginia, with its Mingo, to Pittsburgh with its suffering and bitter fighting.

The Union as guided by Mitchell and White was something different than the Union under the Lewis leadership. Too much power went to the heads of the present union officials, and as always, too much power means ruin not alone to those in control, but to those they seek to control.

The passing of the United Mine Workers of America as now organized is a good thing for the bituminous coal industry.

Costly Strikes

THE bituminous industry seems to be one of the last strongholds of the strike idea. According to the Bureau of Labor Statistics, strikes are losing their popularity in the United States. When this Bureau was established 13 years ago, the annual number of strikes and lockouts for all industry was over 2,500. The number has steadily decreased until the year 1927 reached a total of but 700 for all industry. They also report that the number of persons participating in strikes has decreased in like proportion, the highest number on record being more than four million involved in the steel strike of 1919, and the lowest approximately three hundred thirty thousand in 1926.

It is now a well established fact that the economic loss due to the exercising of the right to strike is borne almost entirely by the public and the striker. Figures issued from reliable sources indicate that the public suffers most from the economic loss incurred by a strike, the striker second, and the employer last. As facts and figures make plain to the public the uneconomic value of the strike, as industry itself is brought face to face with the lack of wisdom in such a policy, the strike as a weapon of defense will cease to exist.

The Five-Day Week

RECENT press dispatches announce the adoption of the five-day week by the cloak, suit and skirt industry in New York City. An agreement for a piecework system replaces the weekly wage.

In our October, 1927, issue we published a symposium as the result of a national questionnaire on this subject. The conclusion reached at that time was that each industry must be judged by itself. A machine-industry would have great difficulty in speeding up efficiency to offset the loss in time. Some industries might be better off, while others could not exist under such an arrangement.

The garment workers' trade is composed principally of immigrant and alien labor and has for many years been the center of radical agitation. It is hoped that the piecework system may keep production costs within bounds and yield freedom from further strife. The field is not one for legislation. The American public will weigh the economic merits of each case. It may be said that two days of leisure per week will increase consumption along many lines, while on the other hand if a six-day wage is paid in five days, production cost must increase, and thus automatically limit the purchasing power of the laborer or else if he is only paid for five days at the former rate, his own earning capacity has been reduced and he can no longer afford to purchase as much.

The result of the New York agreement will be viewed with interest.

Selection and Training of Personnel

"IMPORTANT as mechanization has become, when the last word has been said on the subject, there will remain some hundreds of thousands of men to be dealt with individually and collectively and to be reconciled and adjusted as to their technical fitness and their mental attitudes toward the facts of the industry."

The above is quoted from a paper on "Selection and Training of Personnel," by H. S. Gilbertson, of the Lehigh Coal and Navigation Company, which appeared in our July issue.

Unquestionably better performance and better industrial relations are things to be desired. Mr. Gilbertson believes both can be achieved through proper selection and training of personnel. He asserts that the most important function of direct personnel administration is selection of men; that there are thousands of technical and temperamental misfits in industry; that many traditions must be scrapped; that the miner who has learned the business from his father by a sort of folk lore method, must be re-educated to the mining system in which machine methods predominate, must learn new methods of development, new application of explosives and must achieve higher standards of recovery.

All of this means leadership, and must come from the foreman up to the president, and from the president down to the foreman. Frequently, to the miner the foreman is the company. He must be selected with care, and properly trained to deal with his men. The mining industry is giving considerable thought to this subject, and in many instances is adopting some such plan as Mr. Gilbertson advocates. A number of companies have definite systems of personnel training, and gradually the hit-or-miss policy of placing men in responsible and key positions will be eliminated. The sooner the better, because the basis of all friendly relations in industry is understanding. And it is only through trained men that any company can hope to have its policy thoroughly understood by its employes.

The Business Outlook

ANY FORECAST as to what the balance of the year will bring forth in business prosperity must be based upon reports from the steel industry, automobile plants, building construction, and the market outlook for such industries, as copper, lead and zinc, and coal.

According to *Iron Age*, steel mills of the country are operating close to 75 percent of capacity. There are no stocks in storage, and production is going directly into consumption. Automobile companies report a large volume of unfilled orders, even though high production records are being maintained. According to the financial press, the farm implement business is the best it has been for a period of 10 years. Prosperity is apparent throughout the corn belt, and good prices are assured for many products.

In practically all branches of the mining industry, the outlook is promising. The outlook for copper is better than it has been for some time. Costs, prices, markets and profits are fairly well stabilized. There appears to be no reason for predicting anything other than improvement in zinc, and lead should show marked improvement as the result of an increased demand due to a resumption of building and construction that now seems certain to come next year.

The bituminous coal industry seems to be the only branch of mining in which no great immediate improvement may be expected. The working basis for settlement of the strike unquestionably will have some effect upon production in certain fields, and will permit a number of mines that have been closed to operate. The present tendency in the industry to close unprofitable mines, should help the general situation. On the whole, the outlook is more comforting than it has been in many months, and unquestionably, the recovery will exceed any expectations based only on present conditions.

The improvement of the mining industry will undoubtedly help a large number of allied industries, such as the machinery manufacturer, transportation and agriculture. The general outlook is favorable, and there seems every reason to anticipate a period of prosperity.

Our Critics

IF ANYTHING was needed to convince us that we occupy an enviable position in the world today, the endless volume of criticism of our methods and manners that constantly finds its way across the seas would be convincing. Many Europeans seem to feel qualified to tell us how we may improve ourselves, and intimate that if we were only wise enough to pattern after our friends on the other side of the ocean, we might really amount to something when we grow up.

An eminent British professor assails our institutions in no mean terms in a recent issue of *Harpers*. He does not approve of our methods of government, of our Houses of Congress, in fact, of anything we have done, and insists that, "America is applying eighteenth century ideas and institutions to the problems of a twentieth century civilization." While he admits our supremacy in world matters, he asserts that our President is chosen willy-nilly, and is frequently a man of "scant qualifications." "A Cabinet member in retirement is one of the unburied dead." Equally, most "Congressmen are unsuccessful lawyers * * * and the House of Representatives is a refuge for the mediocre in national politics." He takes us to task for our lack of interest in politics, and contrasts us unfavorably with the highly developed political machine of European nations.

All of this is naturally the result of racial bias. Some foreigners can not look with any degree of favor upon American Institutions. Nevertheless, while European scientists are dissecting us, their governments are at the same time sending delegations across the ocean to learn first-hand how we have achieved such interesting results.

Our system of government is not perfect. But there is not a nation on earth today that either has or can duplicate our performance. There is not a nation in the world where the individual has such opportunity, such freedom, and such protection. Our Congressmen and Senators are not perfect. There are some of them that should be eliminated from our national life. But they are vastly in the minority. For the most part, Congress is representative of the people of this country. Every stratum of our national life has a right to be represented in that Congress. It is sometimes unfortunate that this is the case, especially when certain districts are over-ridden with Europeans permitted in the United States under our immigration laws, but who have not yet assimilated the truth and spirit of America.

So far as our not having developed statesmen in comparison with Europe, just what would this critic call

Mr. Charles Evans Hughes? And if we take our public officials, Democrat and Republican, from President on down the line, we venture the modest assumption that they will stack up with the so-called great minds of Europe.

It is everlastingly to our credit that in the short period of 152 years we have attained such a place in world affairs that other nations feel called upon to decry our lack of wisdom in not emulating older governments, and spend endless time in endeavoring to ascertain how we have risen to such heights in so short a period. Truly, the rank and file of our people are responsible for, as well as to, their government, and this is the ideal of a free republic.

Federal Control Fallacies

THE PUBLIC may well be concerned over all attempts to inject Federal control, either by ownership or operation, into our public utilities. It has been claimed that Federal regulation is necessary for interstate power, but as a matter of fact the amount of power so transmitted is a small proportion of the total power generated, the latest figures being 9 percent. Of the remainder, 83 percent was consumed within the borders of the state of origin, and 8 percent was interchanged by interconnecting systems under the super-power plan, to meet load demands of temporary character.

Public Service and Blue Sky Commissions in practically all the states, hold supervision of rates and the issuance of securities.

We have frequently pointed out in our columns the many fallacies of the Boulder Dam proposition to put the government in the power business. It has likewise pointed out that the American taxpayer's investment in Muscle Shoals will be best protected and yield the largest revenue, by sanctioning supplemental power developments to make possible full control of stream flow and then leasing the project at a proper price, to the net work of power companies who are prepared to distribute the power so generated over the widest possible area consistent with economic transmission.

As has repeatedly been said, the whole problem is: "Shall the Government use its funds secured by taxation, to compete with the savings of the taxpayer?" The Government must either become a monopoly in the power business, or it must keep its hands out of the industry. There is no reason for us to abandon those ideas and ideals under which we have prospered, and to experiment with socialization and federalization.

"All those things which in their nature afford sufficient reward to prompt human endeavor should be owned and operated by the individual and not by the Government."

Rightful Agencies

A RECENT article in the *Saturday Evening Post* by Senator Caraway, of Arkansas, calls attention to the efforts to influence legislation during the sessions of Congress.

In this article the Senator very properly exempts from criticism, and in fact commends THE AMERICAN MINING CONGRESS and a few other groups, recognized as the national headquarters and clearing houses of their respective industries.

Certainly no member of Congress, no matter how versatile his education, or extended his experience may be, unless he has grown up in the mining industry, can hope to be well versed in the intricacies and the complexities of mining and metallurgy with their complex and interlocking problems of freight rates, labor, tariff, and taxation.

No one better than Senator Caraway himself, coming from a state as rich in mineral resources as Arkansas, can appreciate the value of complete and authentic and unprejudiced information about a great and a basic industry.

Members of Congress and Government officers themselves have learned to rely upon these recognized organizations as speaking for the industries they represent, and they have little to fear, except unwarranted annoyance, from the fly-by-night campaigners, the blatant self-seeking minorities, and the repetitious senders of chain letters and telegrams.

Trade Associations

MORE and stronger trade associations, organized under proper conditions and with adequate safeguards, were advocated by Gilbert H. Montague, before a conference on Sales and Distribution. Mr. Montague stated that recent decisions and rulings of the Supreme Court, the Department of Justice and Federal Trade Commission made such associations feasible. He further states that "Trade Associations are better fitted for this work than any other human agency. They have the facilities and the law now gives them the right, so long as they avoid all unlawful price agreements, to collect and disseminate accurate statistics regarding production, stocks on hand, sales and all other trade information necessary to enable each producer and distributor to regulate his business with full knowledge of the condition of the market."

There is no question but that the Trade Association can be of material assistance to industry. And there is no industry that needs its services more greatly than the mining industry. The mining industry should take advantage of whatever new leeway is given them in the interpretation of the anti-trust laws, and profit accordingly.

The Western Mining Meet

LAST YEAR, when the Western Division of The American Mining Congress met at Salt Lake City, an innovation was adopted by the inclusion in the program of papers on practical operating problems. It has been maintained that in order to obtain a full discussion of problems confronting metal producers, it was necessary that the practical operator be given an opportunity to tell his difficulties.

The Western Division holds its 1928 meeting at Los Angeles, September 10 to 14. With it will be held meetings of the Western section of The American Institute of Mining and Metallurgical Engineers, and the California Development Association. This insures a program of unusual merit. The Institute can always be depended upon to develop a splendid program for the discussion of the technical problems of the industry. The American Mining Congress, through its Western Division, will present a program of economic problems which will bring to the attention of the nation the great needs of our vast mineral industries and in addition, will discuss the practical operating problems of the industry. Such a program can hardly be surpassed, and is one in which every mine operator from President to foreman will wish to hear.

The meeting at Los Angeles promises to be a most interesting event. The committee in charge of arrangements is guarantee sufficient for its excellence.

SOME OBSERVATIONS *on the* INCOME TAX ACT *of* 1928

By GEORGE E. HOLMES*

New Income Tax Statute Makes Contents More Accessible, And Eighty Percent Of Taxpayers Will Find Sections Governing Their Returns In First Twenty-three Pages —Provisions Relate To 1928 And Future Years While 1926 Act Governs Collection Of Back Taxes—Important Step Toward Improvement Of Income Tax System

ON May 29, 1928, at 8 o'clock in the morning, the President affixed his signature to "An act to Reduce and Equalize Taxation, Provide Revenue, and for Other Purposes," and thereby instituted a new law marking a departure in the form of our income tax statutes.

The change in form from that of earlier laws will probably be confusing for a time to those who are accustomed to find in certain positions in the printed copies of the law those provisions in which they are interested. To them, the table of contents, an integral part of the act, may be recommended. This is the first time a table of contents has been included in a revenue act. Its obvious result is to render the contents of the act more accessible to the reader.

The principal feature of the new arrangement is the distribution of the provisions of the act into two classes—general provisions of interest to most taxpayers, and supplemental provisions of interest to special classes of taxpayers or applicable only to extraordinary transactions. It is predicted that approximately 80 percent of the taxpayers who will file returns under the new act will find practically all the provisions of interest to them in the first 23 pages of the act, instead of being required to search to and fro through the entire act as required in the past. The general provisions of the act contain only 42 cross references (as compared with 285 in the revenue act of 1926) and very few are not sufficiently self-explanatory to enable the reader to determine at once whether or not they are of interest to him. The result is a far step in advance toward simplification of the act for the benefit of the great class of ordinary taxpayers.

The new law also differs materially from preceding acts in another important respect; each of the acts from that of 1918 to that of 1926, reenacted all the provisions of the preceding act, with changes, omissions and additions, and then repealed the preceding act. The result was confusion and complications. The revenue act of 1928 is infinitely simpler in this respect as it contains only provisions relating to 1928 and future years. It is gratifying to note that Congress saw the importance of making a fresh start, and that in the new law the taxpayer will not be compelled to wade through many provisions having reference only to preceding years and back taxes. The revenue act of 1926 is amended and kept in force for the purpose of governing the collection of back taxes.

The desire to simplify the new law has led to one temporary complication, in that the general administrative provisions governing the collection of revenue are not reenacted in the new law but are still contained in the revenue act of 1926, amended, however, by certain provisions of the new law. This will make it necessary for the time being, to consult both the revenue act of 1926 and the new law in order to understand these provisions. Simplification in this respect, however, is promised in the report of the Senate Committee on Finance, which states that it is planned ultimately to combine all general revenue provisions including those relating to the Board of Tax Appeals and general administration into a separate compilation or code. It is to be hoped that this important work will be undertaken at once and enacted into law at the next session of the Congress.

The new law is generally retroactive to January 1, 1928. Many of the retroactive provisions in the House bill were modified or eliminated. It is encouraging to note that the Senate Committee on Finance apparently regards retroactivity (beyond the beginning of the current year) generally with disapproval. It is to be hoped that this all too frequent practice will fall into disreput and that some day we may find revisions of the law taking effect in the future instead of the past, thus giving the taxpayer due notice of the change in advance.

No change was made in the rates of normal tax or surtax on individuals. The commendable recommendations of the Senate that taxes on incomes between $21,000 and $80,000 be slightly reduced was rejected in conference, and taxpayers in that class still labor under an undue burden as compared with others.

The corporation rate was reduced to 12 percent. In the case of domestic corporations with net incomes not exceeding $25,000, the specific exemption is increased from $2,000 to $3,000. This rate is still unduly high as compared with the normal tax rate on individuals, and a logical equalization of the burden as between stockholders and others among taxpayers will not be found until these rates are more nearly at a parity.

It is noted that the list of exemptions from tax grows steadily with each revision. Four new exemptions are added this year, one affecting income which may issue from public utilities and accrue to states and political subdivisions, another exempting teachers in Alaska and Hawaii, a third intended to encourage the sale of old ships and construction of new ones, and a fourth affecting foreign central banks of issue. The growth of exemptions is not a desirable spectacle in any tax law, especially if the exemption is in the nature of a subsidy to a particular group of taxpayers, and the hope might be expressed that Congress will look with increasing disfavor upon the practice of increasing the number of instances where the tax is waived for some ulterior purpose, no matter how commendable that purpose may be.

The definition of gross income and deductions from gross income were not

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materially changed. Inheritance and estate taxes are allowed as a deduction to the estate only. Taxes assessed against local benefits may be deducted to the extent that they may be properly allocable to maintenance or interest charges.

The difficult questions of depreciation and depletion in the cases of life tenant and remainderman are simplified by declaring that the life tenant shall be entitled thereto as if he were the absolute owner of the property—that is in accordance with the estimated useful life of the property—for each year that he holds the property. In the case of trusts, the total income of which is distributed annually, the beneficiaries shall divide the allowance in proportion to the shares. If the trustee is required by the terms of the trust to keep the property intact by retaining a reasonable amount of income to cover depletion and depreciation, he shall have the allowance. Presumably in the case of discovery depletion the allowance should be taken by the beneficiaries, although the law is not as explicit as might be desirable on this point.

No change is made in the depletion allowed to taxpayers owning mines. A percentage depletion plan with respect to certain classes of mines was considered at one stage of the progress of the bill through Congress, but was dropped until further studies could be made by the experts on the staff of the Joint Congressional Committee on Internal Revenue Taxation.

A special provision is inserted to cover cases where an employer transfers a pension reserve to a trustee. To the extent that such reserve has not been deducted from gross income in the past it may be deducted over a period of 10 years in the future. It is also provided that upon distribution of funds from a stock bonus, pension or profit-sharing plan, the employe is taxable only upon the amount contributed by the employer and the earnings of such fund. Increases in the value of the stock or securities which may be distributed are not taxed to the distributee as was formerly done. Annual contributions by the employer to the trustee are deductible as a business expense.

The earned income credit is increased to a maximum of $30,000, but the method of calculation remains unchanged.

In the case of casual sales of real property, the taxpayer may deduct a reasonable allowance on future expense liabilities under certain prescribed conditions, or he may treat the sale as an installment proposition if the initial payment does not exceed 40 percent of the selling price.

Casual sales of personal property for a price exceeding $1,000 may be treated as installment sales if the initial payments do not exceed 40 percent of the selling price (instead of 25 percent as provided by the prior act).

The statute expressly provides that if a taxpayer elects to adopt the installment basis for reporting income, he must include amounts received in the year of transition and in subsequent years, notwithstanding such receipts may be realization of income theretofore reported on the accrual basis. While this appears to be taxing the same income twice, the benefit of changing to the installment basis is considered sufficiently great to offset any disadvantage arising from this rule which is now embodied in the statute and which has heretofore appeared in the regulations. No change in this provision of law is made for past years, the Congress preferring to leave the construction placed upon the 1926 act by the Board of Tax Appeals for judicial determination.

Some difficulty and loss of revenue has been experienced in cases where installment obligations have been distributed as liquidating dividends or upon death. The new law contemplates that in such cases the transferor shall be regarded as taxable in the year of distribution or transmission upon the deferred profits represented by such installment obligations. The Senate Committee on Finance states that since the installment basis accords the taxpayer the privilege of deferring the reporting at the time of sale of the gain realized until such time as the deferred cash payments are made, the law may properly terminate the privilege of longer deferring the profit if the seller at any time and in any manner disposes of his right to receive further deferred payments. The experience of the Treasury Department has been that this right to terminate the privilege of reporting on the installment basis must be preserved in the law to avoid loss of revenue particularly in cases of death, where a new basis is taken by the recipient, or in liquidation of a corporation when the profit can be shunted into the class of capital gains.

The law also provides for proper adjustment where installment obligations are disposed of for other than face value.

The changes in the basis for gain or loss may be summarized briefly as follows:

In case of the sale of property by an executor, the value of the property at the date of decedent's death shall be the base. For past years a complicated rule is provided which apparently is intended to prevent the Treasury Department from opening cases but which will permit the taxpayer to do so if desired.

In the case of sale of property by a beneficiary, the basis shall be the value at date of decedent's death where the property was received under a specific bequest of personality or a general or specific devise of realty, or the transmission of realty by intestacy; in other cases, such as personal property transmitted by general bequest or by intestacy or in the distribution of property purchased by the executor, the basis is the value of the property when received by the beneficiary. In the case of revocable trust, the basis shall be the same as if the trust instrument had been a will executed on the day of the grantor's death.

Under the revenue act of 1916 it was provided that in the case of property received in the organization or reorganization of corporations, the base should be the same as that of the transferor, except in cases where the property consisted of stock or securities in a corporation a party to a reorganization. This exception was construed to mean that if the property consisted of stock or securities in a corporation a party to a reorganization, the basis should be the fair market value of the property at the date of acquisition by the corporation. This was regarded as a means of avoiding tax by reorganization and while the Committee on Finance expressed doubt that the courts would construe the provisions of the 1926 act so as to permit the escape of revenue under these circumstances, the exception referred to has been eliminated from the new law. This change may result in making reorganizations taxable where the form is not carefully observed and kept within the limits of the statutory provision.

The very difficult question of determining taxable profit on the sale of property acquired during the period of affiliation of two or more corporations and sold thereafter is solved by delegating to the commissioner very broad powers in prescribing regulations under general principles of the statute. This delegation of semi-legislative power is a radical step which, if found practicable, may result in future revenue acts being drawn along broad lines of general principles and reposing a quasi legislative power in the administrative officers. The "period of affiliation" referred to in this provision is that prior to 1922 during which the filing of consolidated returns was mandatory and the years subsequent to 1921 when the filing was optional if in the latter period the corporations were affiliated and filed consolidated returns. The rule after 1928 is that the commissioner shall prescribe the rules for determining the taxable liability of an affiliated group both during and after the period of affiliation.

The entire subject of consolidated returns is revised and new rules laid down for 1929 and subsequent years. All members of an affiliated group will be required to assent to the regulations to be prescribed by the commission in order

to obtain the privilege of filing a consolidated return. The commissioner is given complete authority to prescribe such regulations as he may deem necessary in order that the tax liability of the group as a whole and of each member may be determined in such manner as clearly to reflect the income and prevent avoidance of tax. Notice of deficiency to one corporation of a group filing a consolidated return shall suspend the running of the statute of limitations with respect to all. Consolidated returns shall not be permitted to include ordinary business corporations and insurance companies, nor embrace foreign corporations. However, 100 percent owned subsidiaries organized under the laws of a contiguous foreign country and maintained solely for the purpose of complying with the laws of such country as to title and operation of property, may be treated for purpose of consolidation as a domestic corporation.

The former rule of 95 percent ownership is maintained as a requisite for affiliations, but is limited to cases where the ownership is through a common parent corporation owning 95 percent of the stock of at least one subsidiary, the others, if any, being owned to the same extent by the parent corporation or by a subsidiary. Consolidation will not be permitted by reason of common ownership by the same interests.

Special provisions for 1928 provide that affiliated corporations may file a consolidated return. The return for 1928 must be on the same basis as that used in 1927, unless permission to change the basis is granted by the commissioner.

Filing consolidated returns will generally be optional with the taxpayers entitled to the privilege but consolidation of accounts in the case of two or more trades or businesses, owned or controlled by the same interests, may be required by the commissioner if he determines it is necessary in order to prevent evasion of taxes or clearly to reflect net income. The former provision requiring him to consolidate accounts at the request of taxpayers is eliminated.

The requirement for withholding tax on payment of interest on so-called tax-free covenant bonds to non-resident aliens is changed to require the withholding of 5 percent against individuals and partnerships and 12 percent in the case of foreign corporations in cases where the covenant provides for paying only 2 percent. But where the requirement of the covenant is to pay all of the normal tax required to be withheld, then the requirement is limited to 2 percent. The purpose of the amendment is, of course, to require the withholding of as much tax as possible without imposing an undue burden on those corporations which have covenanted to pay the normal tax for its bondholders.

Congress recognizes the hardship which may arise from an immediate demand to pay additional taxes in cases where a deficiency is found and provides that in exceptional cases the commissioner may grant an extension of 18 months. The former rule was limited to six months' extensions.

The general rule in the new law as to the time in which taxes for 1928 and subsequent years must be assessed is two years after the return was actually filed, except (a) in the case of a false or fraudulent return when no time limit is prescribed, (b) in cases where waivers are filed before the expiration of the period, and (c) in cases where the commissioner is prevented from making an assessment after sending out a 60-day letter. The running of the statute is suspended during that period and for 60 days thereafter.

The suspension of the running of the statute applies in any event to a period ending 60 days after the final decision of the Board of Tax Appeals in any proceeding in respect of the deficiency placed on the docket of the board. This provision is intended to govern cases where the board dismisses the proceeding for any defect in the petition or with respect to the time in which it should be filed and in other cases where the decision of the board may rest on a ground apart from the merits of the case. Under such circumstances it was doubtful if the running of the statute was suspended under the 1926 act.

Corporations about to be dissolved may request a prompt assessment in which case, and under the circumstances prescribed in the law, the assessment shall be made within one year after the request is made. This provision will be helpful in determining the liability of transferees of dissolved corporations as by the filing of such request a speedy settlement of the tax of the transferor may be had and uncertainty with respect to the liability of the transferees removed. Some doubt having arisen as to the liability of a transferee under the present law, the new law contains express provisions with regard thereto and prescribes the time limit within which proceedings must be taken.

The various interest provisions of the law are gathered together in one place instead of being scattered as in the former law. This improvement in form was highly desirable and lends great assistance to an understanding of this complicated subject. Unfortunately there is still a complication in rates of interest, some cases being 6 percent and others 12 percent per annum. The higher rate is generally in the nature of a penalty but not always, as witness the exaction of interest at the higher rate on the unfortunate taxpayer who may not be able to pay a deficiency within the time allowed him or the one who has had a jeopardy assessment made against him followed by immediate notice and demand and who may then have to wait the full period of 60 days allowed to the Government after such assessment before receiving the 60-day letter which informs him of the grounds on which the tax is alleged. It seems only proper that the interest rate should in all cases be on a commercial basis to compensate for the delay in payment and should not be used for ulterior purposes, such as inflicting additional penalty.

The uncertainty of the waiver questions under the present law is cured by providing that the waiver must be filed before the expiration of the statute of limitations. Waivers for 1928 and subsequent years filed after the expiration of the statutory period are apparently intended to be void and of no effect. This is also intended with respect to waivers filed after January 1, 1929, covering years prior to 1928, but waivers for such years filed after the enactment of the law and before January 1, 1929, are expressly declared to be valid. The validity of waivers made prior to the enactment of the act are to be determined according to the law in existence at the time such waivers were filed.

An interesting legal question is raised by the repeal, as of February 26, 1926, of Section 1106 (a) of the revenue act of 1926, which provided that the running of the statute should not only bar the collection of the tax but also extinguish the liability. This retroactive appeal revives taxes which have been declared by legislation not to exist. It amounts in effect to imposing new taxes on a special group of taxpayers and the selection of that group for special taxation is a proceeding open to much criticism. The repeal of this provision was intended to open the way for another new provision which asserts that in cases where assessments were properly made prior to June 2, 1924, and the collection of any part thereof was stayed by the filing of a claim for abatement, the Government may collect the amount abated within one year after the enactment of the law, notwithstanding the six-year period of limitation on collection has expired. This result is accomplished by permitting taxes to be recovered in ordinary cases on the ground that they were paid after the running of the statute but denying this right in the cases where abatement stayed collection.

On the whole the statutes of limitation are designed to bring about a more prompt extinction of tax liability. Among the new provisions is one which limits the Government to two years in which to recover refunds erroneously made. Formerly the Government could sue at any time to recover refunds on the ground of error.

In this connection it is interesting to note the new provisions of law relating to closing agreements. Under the former laws, a closing agreement could be entered into only after the additional tax if any, or the refund, if any, had been paid. Generally a request for a closing agreement was the signal for an intensive reexamination of the case and more work for the taxpayer or his representative. Under the new provisions, the power to make closing agreements is extended to any officer or employe of the bureau including the field service, so authorized by the commissioner. Such agreements become effective when approved by the Secretary or Undersecretary of the Treasury. Closing agreements may be made on any point in the case, as for instance, depreciation or depletion, and do not have to wait upon the complete audit of the case and the final fixing of the tax. Under this procedure it may be possible to arrange for the final settlement of cases point by point, thus making steady progress towards final complete determination of tax liability. It may be possible to do this in the field instead of at Washington, thus accomplishing a sort of decentralization, leaving only disputed points to be argued out before the bureau or Board of Tax Appeals. The possibilities of this new procedure are vast and important and may go far towards correcting the delay and congestion now existing in the bureau and the board. It is hoped and believed that the bureau and taxpayers will cooperate fully to bring these provisions to full fruition in the settlement of cases.

The writer does not intend within the compass of this article to enumerate every change made by the new law, but to record his observation on those changes in substance and procedure which mark important progress towards improvement of our income tax system. Great strides have been made in the adoption of the new form. Imperfections may still be found in the arrangement but undoubtedly it is infinitely to be preferred over the grouping of provisions in the former laws. The new form will require some modifications as time goes on but should not be radically changed. A matter of no small importance in the administration of any law is knowledge of that law on the part of those it affects. That knowledge can only be acquired slowly over a period of years and every change in the law delays the process. Much remains to be done with respect to the substance of the law. Perhaps it is too much to hope for any rapid progress in this direction, but a tendency towards the enunciation of general principles in the statute and a delegation of broad powers of construction in the commissioner may bring about interesting results. The success thereof depends upon the judicial attitude of the commissioners who will interpret the law. If it is too much to expect judicial impartiality from administrative officers, it may be feasible to create a board entirely apart from and independent of the Treasury Department to have charge of the interpretation of the statute, leaving only the routine of collecting revenue to the fiscal branch of the Government. Under the English system many laws are in general terms with authority delegated by the legislature to a board to make general rules and regulations for its enforcement. A system having one group to lay down rules of construction, another to carry on the work of collection, and a third to hear appeals in particular cases, each independent of the other, ought to function towards a fair and impartial result, not possible where the collecting arm dominates the group charged with interpreting the law.

The United States Treasury Building

The Central Safety Committee of Lincoln Mines

Some of mine rescue men

(*Full captions at bottom of page*)

SAFETY WORK *at* LINCOLN COAL AND COKE COMPANY

By B. B. LEICHLITER *

Safety Begins With The President And Requires Cooperation Of All Officers, Superintendents, Foremen And Employes—Value Of Central Safety Committee—Bulletin Boards And Suggestion Boxes Used—Bonuses Paid For Practical Safety Suggestions—Seventeen Rules For Handling And Firing Of Explosives—No Fatalities In Over Six Years During Which Time Over Two Million Tons Of Coal Was Mined

IN THE latter part of the year 1915 plans were formulated for organized safety work at the Lincoln Coal and Coke Company's mines, located near Uniontown, Fayette County, Pa., and working the Pittsburgh coking seam of coal.

Keeping in mind that "Safety First" did not mean the care given injured before reaching the Doctor or Hospital, which is only "First Aid" and is all to frequently stressed to the point of forgetting the principles of real "Safety," plans were made to prevent accidents, as were also plans for organized First Aid work. In the formulating of safety work plans it was found that "Safety" begins with the president and requires the cooperation of all officers, superintendents, foremen and the employes themselves; also the purchasing department, which must furnish materials of a high standard of quality.

In January, 1916, the first organized meeting was held, and the following by-laws governing the work were framed and adopted:

Section 1—The name of this organization shall be "The Safety Committee of Lincoln Mines." (This was later changed to "The Central Safety Committee of Lincoln Mines.")

Sec. 2—The membership shall consist of the superintendent, foremen and other employes of Lincoln Coal and Coke Co., and shall not exceed 12 in number.

Sec. 3—The purpose of the Central Safety Committee of Lincoln Mines is to have general direction and charge of safety work and "first aid" instruction of employes of Lincoln Coal and Coke Co. The committee shall make such rules and regulations from time to time as are deemed useful and necessary to safeguard the employes and property.

Sec. 4—The committee shall meet at least once in each month. A majority of the members shall constitute a quorum for the transaction of business, and a vote by the majority of the members present shall carry a motion or resolution proposed for action.

Sec. 5—The officers shall consist of a president, vice president, secretary and assistant secretary. The officers shall be elected after the year 1916 at the first meeting held in the month of January.

Sec. 6—The president shall preside at all of the meetings of the committee, if present, and shall have power to appoint subcommittees for specific purposes and to perform all acts incident and usually pertaining to the office of president.

Sec. 7—The vice president shall be vested with the powers of the president and shall act in the absence of the president.

Sec. 8—The secretary may or may not be a member of the committee. He shall attend all meetings of the committee and shall keep a record of the proceedings in a book provided for that purpose. He shall keep a record of all injuries, accidents and cases of sickness reported by the doctor and other members of the committee in available form from which information can be furnished insurance companies for benefits and Working Men's Compensation.

Sec. 9—The assistant secretary shall perform the duties of the secretary in his absence.

Sec. 10—The by-laws may be changed or amended by a vote of two-thirds of the members of the committee at any regular meeting.

Sec. 11—The regular meeting of this committee shall be held on the first Thursday of each month at 7.30 p. m., at office of Lincoln Coal and Coke Co.

A short time later a safety inspector was added to the committee.

In the 12 years this Central Safety Committee has been in existence, not a meeting has been omitted nor an accident or injury passed by without an investigation. Any recommendation made by the safety inspector or member of the committee for the prevention of accidents is thoroughly discussed, and if deemed practical by the majority of the members present, it is ordered put in effect by the president, and at the following meeting must be reported on as being complied with.

Under the supervision of this commit-

Captions for photographs above. Left—Central Safety Committee of Lincoln Mines. Left to right: Fred Longdon, Pete Sifton, J. C. Arison, H. R. Farr, mine foreman and vice president; Edward Franks, B. B. Leichliter, general superintendent; H. K. Graham, David Bennett, superintendent and president; W. E. Meikrantz, Sr., safety inspector; W. C. Litten, assistant secretary; John Pegg, and W. H. Johns, secretary of the committee.

Right—Some of the Mine Rescue Men: Mr. Bennett, superintendent; left, John Pegg, Stanley Soffis, Bruno Szumal, Harold Willis, Mike Andrews, Mike Urom, and H. R. Farr, mine foreman; Pegg, Willis and Urom did good work at the Mather explosion. Emergency hospital is shown in the background.

* General Superintendent, Lincoln Coal and Coke Company, Scottdale, Pa.

tee 20 trained first-aid men, holding Bureau of Mines certificates, and 2 mine rescue crews of 5 men each, also holding Bureau of Mines certificates, are maintained. The mine rescue teams receive retraining every six months, and are attached to the Central Rescue Station at Orient, Fayette County, Pa. This Central Rescue Station is maintained by a number of mining companies within a radius of 10 miles, each company paying their pro rata share for maintenance. All rescue men are subject to call at any time or place for duty. Activities of the Central Safety Committee can be best judged by copies from the minutes, as follows:

Lincoln Mines, Keisterville, Pa.,
February 3, 1927.

The Central Safety Committee of Lincoln Mines met in regular session, with David Bennett, president, in the chair.

The roll of members was called and the following noted were present: David Bennett, president; H. R. Farr, vice president; W. H. Johns, secretary; W. E. Meikrantz, Sr., safety inspector; Edward Franks, H. K. Graham, Peter Sifton, and Fred Longdon.

Those noted as absent were W. C. Litten, B. B. Leichliter, John Pegg and J. C. Arison.

The minutes of the last meeting as read by the Secretary were approved.

The list of accidents for the past month were reported by the secretary, as follows: John Nimic, right ankle sprained; John Kzek, laceration of scalp; John Mach, contusion of right foot; James Leichliter, acid burn of back; Jack Phillips, laceration of scalp; Andy Buffa, Sr., right knee bruised; George Waggett, contusion of left foot; Frank Black, traumatic conjunctivitis of right eye.

These accidents were discussed, but none were found to be of any serious consequence.

W. E. Meikrantz, Sr., safety inspector, reported that everything in and about the mine was very satisfactory and in a safe condition.

The public safety meeting, which was held in the church on January 21, 1927, was very interesting and was well attended. The following persons furnished the entertainment: Rev. M. P. Steele spoke on the subject of "Morals in a Mining Community"; George M. Riggs, of the Mine Safety Appliance Co., gave a very interesting address on "Safety"; Miss Becket, Welfare Worker of Republic, was present and gave a very interesting talk on "Welfare in the Home of a Mining Community"; Charles Opperman and the girls' first-aid team of Orient gave demonstrations in First Aid, which was very interesting and instructive; the orchestra from Bitner furnished the music for the occasion and was well received.

The subject announced for discussion at the next meeting will be "Post Recovery."

The president inquired whether any of the members had anything to offer concerning safety in or about the mine. After a general discussion, it was properly moved and seconded that we adjourn. This was so ordered.

DAVID BENNETT,
President.
W. H. JOHNS,
Secretary.

A corner of the power plant showing type of machinery guarding used

View showing standard type of mine timbers used. Also main entrance of slope

Well shaded lawns, good gardens and all deep well drinking water; hard surfaced roads, two churches and good schools make the mining town of Keisterville, Pa., a desirable place in which to live

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Lincoln Mines, Keisterville, Pa.,
February 2, 1928.

The Central Safety Committee of Lincoln Mines met in regular session, with David Bennett, president, in the chair.

The roll of members was called, and the following noted were present: David Bennett, president; H. R. Farr, vice president; W. H. Johns, secretary; W. C. Litten, assistant secretary; W. E. Meikrantz, Sr., safety inspector; B. B. Leichliter, Edward Franks, H. K. Graham, J. C. Arison, Pete Sifton and Freddy Longdon.

The minutes of the last meeting were approved as read.

The accidents for the past month were reported by the secretary, as follows: Rainey Leone, punctured wound of right foot; Harold Lowe, brush wound of right leg; Lawrence Sifton, foreign body in left eye; Harry Dillinger, right foot bruised; Peter Racutt, contusion of left thumb.

The accidents were discussed, but none were found to be of any serious consequence. The accident of Harry Dillinger caused a loss of 23 days. The total time lost for the five accidents was 31 days.

The report of W. E. Meikrantz, Sr., safety inspector, was read, in which he stated that all switches and latches were properly blocked. All banisters and stairways were in good condition. The mine was well posted and ventilated, and all machinery was well guarded.

The president inquired as to whether or not any member had anything to offer concerning safety within or about the mine. After several discussions on various subjects concerning safety, it was ordered that a Safety Rally be planned for the near future.

The meeting was preceded by an oyster supper, which was heartily enjoyed by all present.

There being nothing further, it was properly moved and seconded that we adjourn. This was so ordered.

DAVID BENNETT,
President.
W. H. JOHNS,
Secretary.

Bulletin boards are in use and also suggestion boxes, in which men have an opportunity of depositing safety suggestions, bonuses to be paid for practical safety suggestions.

As the greatest number of accidents in a mine occur at the working face, posting and timbering well done and with the best grade of timber obtainable, de-

creases this hazard. This requires the purchasing department to cooperate in the matter of furnishing the class of mine timbers requisitioned, and not the cheaper grades that are all too expensive in the end. Where formerly we were using 8-ft. split and 8-ft. 4-in. top end post, along with 10-ft. 4-in. and 5-in. top end, we adopted 8-ft. 5-in. top end and 10-ft. 5-in. top end all-round hardwood as the standard post. While costing a little more at first, we found that they were all used by the miner, whereas in using split and standard 4-in. posts, if some were not up to the miner's idea of what a post should be, he threw them back in the gob pile and covered them up, and no blame attached to him on the part of his foreman. Results were that the number of posts used decreased, the cost of timbering per ton of coal mined did not increase, and accidents (the ultimate goal) were decreased. Too much stress can not be put on the quality of mine timbers in an accident-prevention campaign, and the only other phase equaling it is supervision.

Shot firers were employed to do all the shooting, where formerly each miner did his own, and the following rules for handling and firing explosives were formulated and put in effect:

Rule 1—No packages of explosives shall be opened either inside of storage magazine or distributing magazine. Packages must be opened with a wooden wedge and wooden mallet.

Rule 2—No smoking, open lights or fire allowed in magazines or while engaged in handling explosives or detonators in any manner whatever.

Rule 3—No persons other than those designated to handle explosives shall be permitted to enter magazines. Magazines shall be kept securely locked.

Rule 4—No explosives or detonators shall be left in any occupied house, shop, office or operative mine building.

Rule 5—No more than one day's supply of explosives shall be kept in distributing magazines. Detonators shall be stored separate from explosives at all times.

Rule 6—The mine foreman shall designate shot firers, employed as company men inside the mine only, to handle all explosives and detonators, fire all shots and report all missfires, blow-out shots, and holes he refused to load to the mine foreman. A record of all missfires, blow-outs, and holes refused to be kept in a book provided for the purpose at the mine foreman's office.

Rule 7—No explosives or detonators shall be stored inside the mine. The shot firers shall only take sufficient quantity of each to complete their rounds. Should any remain, it shall be returned to the distributing magazine and detonator house.

Rule 8—Explosives shall be carried in heavy burlap sacks and detonators in nonconductive receptacles, with separate compartment for each detonator.

Rule 9—No shot firer shall carry both explosives and detonators at the same time, other than that sufficient to load holes in one working place. Detonators shall not be attached to explosives until shot firer is in the working place in which shot or shots are to be fired.

Rule 10—Shot firers shall examine places for safety before and after firing all shots, and are prohibited from firing any shots in a gaseous or dusty place.

Rule 11—Only one kind of explosive shall be used in a hole. All holes shall be filled and tamped full length with clay. Tamping bar shall be of wood only.

Rule 12—Shots shall be fired with an approved battery only, using electric detonators of not under No. 6 strength, with not less than 100 ft. of lead wire. All lead wires shall be examined frequently and kept in good condition. Ample warning shall be given before firing a shot. Proper signals shall be agreed upon and extra precaution shall be taken where two places are coming together. Adjacent shots shall not be fired simultaneously from within the mine.

Rule 13—No explosive but permissible powder shall be used inside the mine. Each charge shall not exceed 1½ lbs.

Rule 14—No holes shall be drilled within 6 in. of the back of the cut. All holes to be drilled as nearly level as possible and approximately 1 ft. below draw slate at back of hole and same distance from rib at back of hole.

Rule 15—No shooting from the solid shall be done except when all persons are out of mine but the shot firers and persons delegated by the mine foreman to take care of property.

Rule 16—No explosives shall be removed from a hole once it is loaded. In case of a missfire, a hole must be drilled parallel with and at a distance of not less than 2 ft. from the hole containing the unfired shot. After firing of the adjacent hole, no one shall enter such place until after an interval of 15 minutes shall have elapsed. An interval of 15 minutes must also elapse before entering place where missfire has occurred.

Rule 17—Shot firers shall refuse to shoot holes in dusty places and must notify foreman of all such places, whose duty it will be to have such place thoroughly wet down for a distance of 80 feet from the face before shot is fired.

All the foregoing rules must be observed or suffer penalty as provided by law for nonobservance.

All machinery was guarded according to standard required by the coal-mine section of the Pennsylvania Compensation Rating and Inspection Bureau.

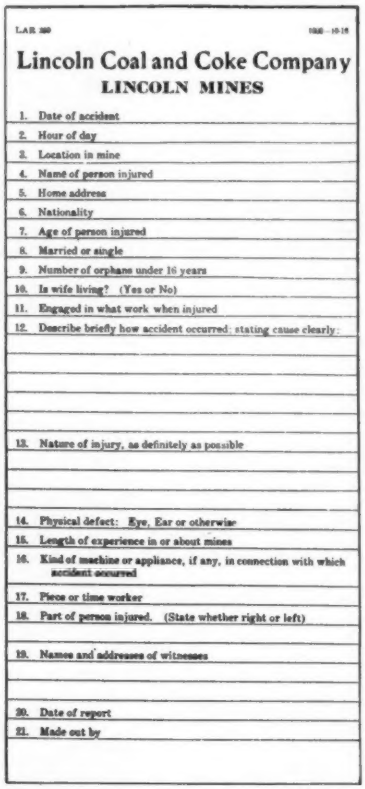
Due consideration was given to labor turnover. A high labor turnover means a high accident rate and inefficiency. We have many employes whose length of service runs from 10 to 25 years with this company. A low labor turnover means good discipline, an important factor in accident prevention. Excepting two, all our foremen have been with us over 15 years.

In the safety campaigns we have not used many moving pictures showing the hazards and nerve-racking accidents occurring in the mining industry for the reason that it tends to destroy the morale of the men, but, on the other hand, we have given more attention to supervision and instruction to the men in their working places.

The first year, 1916, we had 11 accidents of 30 or more days' disability; in 1917 we had 7; while in 1926 we had only 5 of 30 days or more disability, and only 1 of the 5 reaching 60 days. In 1927 we had the same number. We have not had a single fatality in over six years with over two million tons of coal mined.

First-aid stations are located in various sections of the mine and are fully equipped for giving first-aid treatment. On the outside, near the mine entrance, is the first-aid receiving hospital. Here the patient is cared for until the doctor arrives. If a hospital case, the Uniontown Hospital is only 15 minutes distant; and if not, treatment is given and patient is removed to his home. All injured, no matter how trivial, are reported by the foremen on the form illustrated. This gives a check on the doctor's report of the injury, and an opportunity for the safety inspector to make his investigation of the accident promptly.

The activities of the Central Safety Committee do not end with the investigation, but are extended to the economic condition of the injured man's family, and its final duty is to see that no member of an injured man's family suffers for lack of food or clothing. How well they have performed this duty is attested by the fact that in the 12 years this organization has been in existence there has not been a single case neglected.



LAR 880 1926—10-15

Lincoln Coal and Coke Company
LINCOLN MINES

1. Date of accident
2. Hour of day
3. Location in mine
4. Name of person injured
5. Home address
6. Nationality
7. Age of person injured
8. Married or single
9. Number of orphans under 16 years
10. Is wife living? (Yes or No)
11. Engaged in what work when injured
12. Describe briefly how accident occurred; stating cause clearly:
13. Nature of injury, as definitely as possible
14. Physical defect: Eye, Ear or otherwise
15. Length of experience in or about mines
16. Kind of machine or appliance, if any, in connection with which accident occurred
17. Piece or time worker
18. Part of person injured. (State whether right or left)
19. Names and addresses of witnesses
20. Date of report
21. Made out by

Form used for reporting accidents

BETTER MARKETING *and* DISTRIBUTION *of* COAL

By F. R. WADLEIGH*

An Important Factor In Successful Marketing Is Training Of Salesmen In Knowledge Of Commodity Handled—Statistics Covering Production, Distribution, Consumption And Requirements Essential—Cooperative Selling—Cooperation Between The National Associations Urged

WHAT is distribution? What is marketing? Are the two words distinct in their meaning? There are two uses of the term "distribution"; first the use describing physical distribution, such as transportation and storage; second, the use to describe actual marketing; the two uses are often combined to describe both physical distribution and marketing.

It would seem proper to make a distinct differentiation between the two uses and define distribution as the physical process involved in actual transportation, handling and storage; marketing, on the other hand, is to be limited to buying and selling.

Distribution begins with the producer, as does marketing; each involves the other, but the two are separate operations.

Marketing of coal involves its distribution—distribution is dependent upon marketing.

The coal industry is naturally dependent upon physical distribution, but has little or no control over it.

Marketing, however, is a function of the industry; methods of procedure are largely under its control.

Coal is an article of commerce, a commodity to be bought and sold; a raw material shipped and consumed as such.

The marketing of coal has for its background certain main basic factors:

Supply, Its Source and Geographical Location.
Character of Coal, Chemical and Physical.
Production and Preparation.
Transportation.
Use.
Competition—Competitive Coals and Other Fuels.

In the marketing of coal everyone of these items, with their limiting characteristics and attendant phases, must be considered. Unless each one is given its due weight, marketing of the product cannot be successfully carried on. Sales methods must be predicated and decided upon after consideration of the main factors entering into the subject.

What does a lump of coal mean to the average coal man? Is it not looked on as merely a single commodity which is mined, sold and used "as is?" But consider what a lump of coal really is, what is contained in it, what is involved in its formation, in its production, in its use, what can be obtained from it. Think of the tremendous activities that were required for its formation, of the numerous movements involved in its production, transportation, distribution and marketing, from the coal bed to the furnace. Consider what coal means to industry, to transportation, to our health, pleasure and general well-being—to the world's progress; the many diverse and wonderful substances that can be and are being obtained from it.

It can be said with entire truth that there is no known substance which not only in its technical side but also in its commercial and mechanical aspect, has such a broad contact with life, health and civilization generally.

Yet how many coal salesmen have knowledge of the many uses to which coal may be put and of the products derived from the various uses—of the sciences involved in its passage from its place of discovery to final use, and of the effects of such use.

What activities of the coal industry are involved in the marketing and distribution of coal? Marketing goes back to the very formation and deposition of coal to its geographic location and its location with respect to traffic, to its quality and character—passing on to production, preparation, handling, use, products and storage.

The sale of coal is, after all, the most important factor in the final aim of the coal industry and the coal trade. Everything leads up to marketing; production, preparation, transportation, use—all are components of the marketing problem.

Given a workable seam of coal, what are the main considerations to be arrived at before its actual development? They are:

(1) Character and quality.
(2) Uses.
(3) Markets.
(4) Are mining conditions such that it can be sold at a profit in competition with other coals?
(5) Are labor conditions such that it can be mined cheaply and without interruption?
(6) Are transportation facilities to markets satisfactory?
(7) What are the uses to which it is best suited?
(8) What amount of production can be sold?
(9) What sales organization is necessary and what sales methods should be used?
(10) What will be the selling costs?

It will be seen from the foregoing that each and every activity that enters into the workings of the industry heads in and is closely related to the marketing of the product.

One of the most important factors in successful marketing of coal is the training of salesmen in the theoretical and practical knowledge of the commodity they are handling. This is more the case

* Consulting Engineer, New York City.

with coal than with other raw materials, because there are so many angles to coal marketing, so many different kinds and such strong internal competition. It is, therefore, of the utmost importance to a marketer of coal that he should have accurate and wide knowledge of the various items that are involved in a sale of coal to the consumer, whether it be a retail or wholesale transaction.

Regarding the training of salesmen, the American Gas Association has recently made the following statement; its contents should interest coal men, as they apply in general to the coal industry as well as to the gas industry:

"The gas industry has long felt the lack of educational facilities for its salesmen. The managing committee of the commercial section, American Gas Association, has been active in organizing such an educational course, and has made arrangements with the Business Training Corporation, a nationally known organization engaged in the preparation of industrial educational courses. Preceding the preparation of the course, this company will conduct a very complete survey of the gas field, and from the material and data thus gathered the instruction manuals will be prepared. The survey alone should be well worth the money that will be spent in making it.

"There is little doubt of the need of the course. The expense will be small and probably not as great as the present cost of training salesmen by the haphazard methods now in use. The company preparing the course are specialists in this line of work and furthermore have a national reputation for good work to maintain. Sales managers and educational leaders will give the course in the individual companies according to carefully prepared outlines, and we wager that they will learn a lot about selling from this work themselves. All in all, the gas industry stands to get some help in selling that is at present badly needed."

We can hardly overestimate the vital importance of a thorough knowledge of his product, not only to the coal salesman but also to those directing sales in an executive capacity. The importance of such knowledge is strikingly stated by a most competent authority, in the following quotation:

"Commercial progress in industry has always been measured by the advance in knowledge of those engaged in it. It is impossible for men to acquire or secure all possible knowledge at one time. Its acquisition is a growth, resulting from continuous, intelligent inquiry. The knowledge of an industry that is essential to its success must embrace all facts and circumstances that will in any way influence that industry. These facts and circumstances must include economic conditions, as well as scientific facts, to the extent that science is called into play in its operation and all commercial conditions that make for efficient production, merchandizing and distribution. No one will dispute the foregoing statements; they are fundamental and necessary to the life of trade commerce."

Statistics

"It is a truism to say that no individual business enterprise could succeed or be conducted without waste if it does not know accurately its stocks, the volume of output or sales, the rate of stock turnover, or its orders, or the prices, assets and liabilities and the relation of these to previous periods. Neither can the business of a trade, as a whole, or the nation itself, function efficiently unless it knows these very things. Statistics are a counterpoise to 'psychology' in business—an anchor of basic facts to tie to." (Herbert Hoover.)

For intelligent, profitable marketing of its product, the coal industry, as a whole, needs today much more statistical information than is now available, covering all activities—production, distribution, consumption and requirements.

As is well known, the industry itself has no statistical bureau, nor is there any association or body from which one can obtain first-hand current statistics for the industry as a whole. Other industries are far ahead of coal in this respect.

Not only has the industry no fountain head of statistical information, but it gets little help from any other source.

The only Federal organization that issues current statistics on coal is the U. S. Bureau of Mines, whose work is restricted by the lack of funds and often by lack of help from the industry itself, in securing appropriations and the necessary information, a condition that the coal industry would do well to make efforts to change.

Cooperative Marketing of Coal

Cooperative selling of coal has been brought forward both in this country and in Great Britain as a possible cure for industry selling methods.

In the report of the British Coal Commission of 1925-26, the following summarized statement was made: "The industry, as a whole, has so far failed to realize the benefits to be obtained by readiness to cooperate. Large financial advantages might be gained by the formation, in particular, of cooperative selling agencies. They are specially needed in the export trade."

To consider the recommendations of the commission, a committee was appointed "to inquire into and report upon the desirability and practicability of developing cooperative selling in the coal mining industry, and to make recommendations."

The final report of this committee was not an unanimous one. Of the eleven members, three, all of whom are prominent in the coal industry, took exception to the recommendations of the majority, and no official steps were taken to put the majority's recommendations into effect. In the last year, however, four cooperative schemes have been put into effect in Great Britain by groups of producers and sales companies, but their activities have not progressed far enough to enable any definite statement to be made regarding the results of their operation.

In Germany, as is well known, the marketing of coal is organized in a national system of "Kartells," under which production and sales are conducted by large and coordinated selling pools. This method of coal sales, which originated with the organization of the Rhenish-Westphalian Coal Syndicate in 1893, has as its object "to put an end to unhealthy competition in the coal market." The results have been, it is generally reported, quite successful, but the methods used could not be transplanted to this country.

At Washington, in 1923, a study was made of cooperative selling in the coal industry and a tentative plan was worked out. I believe that the plan proposed is well worth consideration in any discussion of coal marketing and, therefore, it is given below in broad outline detail, so as to present the proposals as a whole, definite plan. The scheme itself was adapted from those in successful operation in the agricultural industries and from similar methods used in the coal industry in other countries.

(1) The coal fields of the country to be divided into districts, having areas of similar geological and mining conditions, with similar classes of coals, competing in the same markets and, as far as possible, with similar transportation conditions.

It is estimated that there would be from 40 to 50 such districts.

There are today 45 district operators associations, 128 classed as mining districts and 248 districts (as classified by the railroads themselves) on the coal-originating railroads of the country.

(2) Any group of mines within such a district to be allowed to form a cooperative marketing association for a fixed term of years, no group to embrace members outside such district limits. The formulation of such cooperative groups to be purely optional with the mines and not to prevent any independent operator from continuing in the field. There could be any number of cooperatives in a district, as, for instance, different groups handling coal from different seams of similar character and quality, but, in any event, there would be a minimum of one cooperative to a district.

(3) The cooperatives would sell coal by district grades and qualities and divide the receipts to the individual operators upon the basis of their proportionate production of each grade or quality.

(4) The cooperative would set aside from gross receipts a fixed amount per ton to provide unemployment insurance among the workers in the group upon some modification of Prof. Commons'

plan, to be administered jointly by representatives of the workers and the cooperative.

(5) The cooperative should set aside from gross receipts a fixed amount per ton, as it might determine to be fair compensation, to be divided over all the mines who join the cooperative, in proportion to their average output over the three years prior to January 1, 1922, in so far as the production of any mine was held in reserve.

Under such limited cooperation the following results should be produced:

(a) As production costs could be greatly reduced by regular operation, the cooperative would necessarily designate such mines of the group to regular operation as would fill its minimum regular sale demands. It would designate certain mines as standbys for erratic or seasonal demand. It would close certain mines until their product was needed. The owners of the last two groups would receive compensation for short production by the operation of the fund mentioned above and it might also be possible to obtain relief from taxes for those of the last group. The compensation both to unemployed mines and workers would probably not amount to one-third of the saving in production costs which upon full time operation are estimated at from 50 to 75 cents per ton.

(b) It is estimated that the group of "full time mines" would produce 90 percent of the sales, and thus full time employment would be obtained for all labor that could be employed at such mines, which would probably be about 90 percent of the total district labor.

(c) The cooperative would enable the abolition of a great number of duplicate selling agencies, eliminating many middlemen, and would necessarily be followed by the establishment of retail yards with ample storage facilities, because the possession of such yards dealing direct with the public would greatly assist the mines in securing regular production. The mines could run on yard stocks when contract business was irregular and would, by building up yard stocks, minimize seasonal operation. The various economies in marketing should save from 50 cents to $1 per ton.

(d) It would give more regular movement of railroad rolling stock, eliminating a large amount of switching, classification and reconsignment, thus reducing the demands on terminals and yards, building up more solid trainload traffic, with consequent reduction of railroad operating costs, and with quicker movement of cars to and from destinations; the cumulative effect would be the giving to the railroads of a greater number of cars.

(e) It would make possible the putting into effect of a more satisfactory and equitable basis or plan of car distribution to the mines, consequent upon the assumed steady operation of a known group or groups of mines.

(f) As the tendency of the competing cooperatives would probably be to confine their sales to their natural market territory, it would mean a reduction of the tremendous number of crosshauls now practiced due to the constant effort of individual mines, sales agencies and middlemen to make uneconomic sales away from their natural markets in the endeavor to obtain sufficient orders to maintain regular mine operation.

(g) Cooperatives would necessarily establish standard grades and sizes for their coal and eliminate the present erratic, inaccurate and sometimes fraudulent standards of quality, as graded coal of known and assured regular quality would attain better markets.

The best coals would not lose their identity while the poorer coals would be improved and markets found for them. As the returns from sales to members of the cooperative would be divided according to the actual receipts from the sale of each grade, a strong pressure would automatically lie upon the individual operator to lift the quality of his product.

(h) Price would be sufficiently controlled by competition between the different cooperatives. A reenforcement to price control lies in two other directions: first, the desire of competent business to sell quantity by encouraging consumption, and secondly, by the fact that the moment prices rose above the amount of the economies in production, new independent operators would again be attracted into the field particularly for contract business.

(i) The ultimate result should be a reduction in the number of workers required in the industry per million tons of coal produced, to the vast improvement of working conditions among those held. There could be no sudden disbandment of staff with large unemployment because (a) it will require some years to create the new organization; (b) there would be no recruiting of new men into the industry; (c) the annual increase in coal consumption.

(j) There should be a national saving in the production and distribution of from 50 cents to $1 per ton. The strong tendency would be for prices to remain stable over the year, and periodic fluctuation from coal produced at a loss to coal sold at undue profits should disappear.

(k) The erection of such cooperatives with the financial strength they could summon, would be the means of greatly extending and putting on a permanent basis our foreign trade in coal. This trade, with the exception of that with Canada and the West Indies, has greatly decreased, partly because of the inability of the individual coal operator to withstand the competition of foreign marketing agencies, which, while not combined in the case of our strongest competitor, do cooperate, with their allied steamship interests, in driving American coals out of foreign markets.

Possibilities in this direction are obvious. Cooperative selling as outlined for the domestic markets, could be developed and extended along similar lines in foreign markets and greatly add to our strength in competition, without destroying the individuality of known brands of coal.

The establishment of cooperatives under this general plan would greatly minimize labor troubles by giving steady employment and fair annual earnings, thus eliminating the greatest source of such troubles.

It would enable mine owners and operators to concentrate on the improvement of mining practices and methods and be an incentive to greater operation economies, as well as to coal conservation, by removing the present necessity for giving such close attention to sales and markets.

It would promote the more widespread use of the lower grade coals by better preparation and by finding more markets and uses for them.

By assuring more steady operation, more regular and assured returns would follow, enabling the mine owner to plan ahead with some certainty and method, a difficult accomplishment today, owing to the uncertainty that exists as to what may be counted on for the future.

It would stabilize the whole industry, make it more coherent, less unwieldy, do away with much of the bitter and unwise competition and jealousies which are charactertistic of the industry today and often put it at the mercy of the large buyers without helping the general public.

Due to such stabilization, assured returns, and greater efficiency it would be much easier to attract the capital necessary for improvements and any needed development.

Whether the plan given in the foregoing paragraphs could be put into effect in this country, even if no change in existing laws be required, I am not prepared to say, but offer the plan for consideration and criticism.

Profitless Prosperity

"Profitless prosperity," or maintaining production without profit, has been termed a symptom of mental disorder.

"We have reached a period when collective action may be required to guard the basic industries from disorganization and possible disaster, following the shortsighted policy of a few producers and distributors."

Admitting the apparent folly and lack of cooperation involved in selling coal

below production costs, how can such action be prevented? Only, it would seem, by the individual corporation being made to realize that success, in the long run, will depend upon the conduct of its industry as a whole; by cooperation and legitimate competition; by service to the public, not in giving it cheap coal merely, but in selling clean, uniformly good coal of its class at a price that will enable the coal man to make a reasonable profit.

The declaration of organization, which summarizes the purposes of an industrial institute recently organized, presents a picture of proposed activities that might well be the objectives of those engaged in coal marketing to their advantage and profit.

"To promote in the industry a mutual confidence and high standard of business ethics; to eliminate trade abuses; to promote sound economic business customs and practices; to foster wholesome competition; to provide ultimately for individual efficient business management operating independently an opportunity to do business with an adequate return, and thus generally to promote the service of the industry to the public welfare."

There are other important factors involved in the marketing of coal. One of the most important of these is a fuel engineering service, which shall assist in making sales and follow up the use of the coal sold. The value of a fuel engineering service in coal marketing is unquestionable a fact fully realized by some of the larger sales companies.

But there is ample room and need for a wider service of the kind described on the part of the coal industry generally.

It has been many times said of the coal industry that its knowledge of distribution and distribution methods has not kept pace with its knowledge of production.

A similar statement might be made with regard to knowledge of methods of use and the question may be asked: Have our coal producers and sellers the knowledge that they should have regarding the actual use of their product, for what use is it best suited, and what actual results will it give in different kinds of use or with different kinds of furnace equipment?

Here, we believe, is a fruitful field in which the coal producer and seller can emulate the methods of those producing and selling other products, especially those manufacturing equipment in or under which coal must be used.

The stoker manufacturer, for instance, is not by any means satisfied with making a sale and trusting that his product will give the desired results in use; he follows up each sale, each installation; he is not through until his stoker performs successfully and satisfies the buyer and his requirements.

Is it not true that many a coal contract or sale of coal has been lost because the coal seller either did not see that his coal was properly handled or did not know its exact combustion characteristics and their suitability to use requirements?

Even after a sale has been consummated and deliveries made, serious difficulties in performance sometimes arise, either through ignorance on the part of the coal seller as to what his coal will do or because of improper handling.

Every local producers' or merchants' association should have, either on its official staff or available on a retaining fee basis, some one thoroughly familiar with the coals of the district, their production, preparation, physical and chemical characterstics, and especially with the uses, methods of use, and with equipment best adapted to obtaining successful results under boilers in industrial furnaces and in house-heating plants.

There are certain other important phases of coal marketing which coal sales organizations and their staffs could study with advantage.

I have not space, however, in which to discuss them in this article, and shall merely name them; entire articles could be written on each one.

The phases alluded to are:

(1) Study of market needs and capacity.

(2) Creating market demand.

(3) The customer, his needs and habits of buying.

Under 1 and 2 are included research with regard to new markets, new uses, market needs and capacity, as well as in the adaptability of the various coals to the different uses and different use equipment.

No. 3 covers what has been called the Psychology of Marketing—a study of the customer, his habits, and mental reactions.

I shall conclude this discourse with a suggestion to the three nation-wide associations in the bituminous coal industry, which, if acted upon and effectively carried out, will not only help in bringing them and their members into closer contact with each other, but will also give them a better and wider knowledge of coal marketing and distribution.

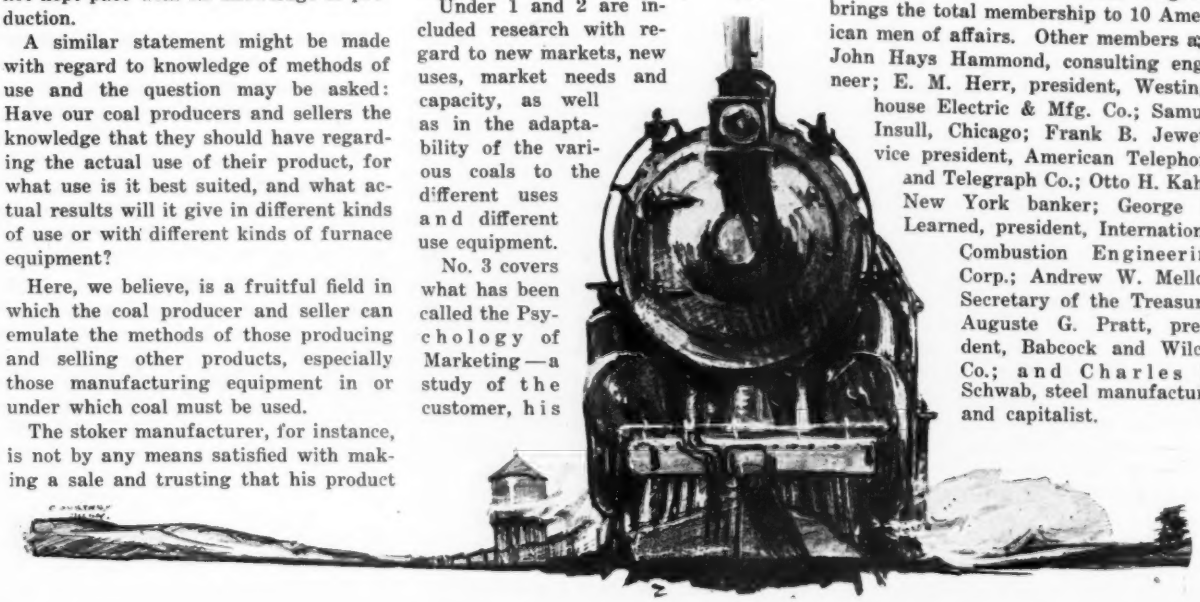
This suggestion is that the three bodies named should instruct their marketing or other specified committees to prepare a pamphlet or report on the marketing of coal for the use of all members and as a guide to better marketing methods.

If the coal industry had spent one-half the money and thought on sales engineering and trade economics that it has on mining and production engineering and methods, it would not, I venture to say, be so subject to the numerous periodic variations in its activities that have always heretofore attended it.

Walter C. Teagle, president of the Standard Oil Company of New Jersey, has accepted an invitation to become a member of the Advisory Board for the Second International Conference on Bituminous Coal, to be held at the Carnegie Institute of Technology in the week of November 19, 1928, President Thomas S. Baker has announced.

Acceptance of Mr. Teagle to serve on the board, the announcement points out, is considered by President Baker and his associates as a significant indication of the increasing interest that the oil companies, particularly the Standard group, are showing in the bituminous coal as the source of motor spirits of the future.

The addition of Mr. Teagle to the advisory board assisting President Baker in plans for the second coal congress brings the total membership to 10 American men of affairs. Other members are John Hays Hammond, consulting engineer; E. M. Herr, president, Westinghouse Electric & Mfg. Co.; Samuel Insull, Chicago; Frank B. Jewett, vice president, American Telephone and Telegraph Co.; Otto H. Kahn, New York banker; George E. Learned, president, International Combustion Engineering Corp.; Andrew W. Mellon, Secretary of the Treasury; Auguste G. Pratt, president, Babcock and Wilcox Co.; and Charles M. Schwab, steel manufacturer and capitalist.



Along the Paths of Rock Creek Park © Harold Gray

"Amid the leaves' green mass a sunny play
Of flash and shadow stirs."

The ECONOMICS BRANCH *of the* BUREAU *of* MINES*

By C. P. WHITE†

This Division Primarily Concerns Itself With Assistance To The Mineral Industries Through The Furnishing Of Helpful Data Upon Their Many Phases To Individual Mining Men, Congress, And Others Who Desire Information —It Is A Comparatively New Activity Of The Bureau And Promises Constructive Service

WITH the transfer of the Bureau of Mines from the Department of the Interior to the Department of Commerce, the question of the economic problems of the mineral industries was automatically injected, or say, given added importance, in the scheme of the bureau's work, because of the duty assigned to the Department of Commerce in its organic act to "foster, promote and develop"—mining and other industries.

A certain amount of work had been done in years past in this direction by the Bureau, under a clause in its organic act authorizing, if not directing, it to inquire into the economic questions affecting the mining industries and to disseminate information concerning this subject, but these activities were spasmodic and subordinated by the Bureau, which in its early days concentrated very largely upon scientific or technologic questions and studies and investigations in the matter of safety in mine work.

It so happens that when this Bureau was transferred to the Department of Commerce, Secretary Hoover asked the several branches of the mining industry to appoint representatives on a committee to advise him how the department could best serve the industry.

Your then president, Mr. Cates, and your chairman of this afternoon's meeting, Mr. Bradley, were members of that committee and joined in a number of recommendations which the committee made, among which was one for the inclusion and extension of the economics work of the Bureau, so that it might be said that the American Mining Congress became at that time the sponsor of this Economics Branch of the Bureau of Mines.

Now, in addition to the other work of the Bureau, the Economics Branch responds to what is probably the oldest and most fundamental demand of the mining industries for assistance, a demand for authentic information as to facts that cannot be obtained by individuals or individual companies as well as by the government.

Many years ago annual confidential canvasses of primary sources of mineral production were undertaken by the United States Geological Survey as a basis for the volumes entitled "Mineral Resources of the United States." Response was also made by the same agency to many requests for facts that could be supplied by the geologists of the Survey because of their contacts with producers of minerals. This work was, as you may remember, transferred to the Bureau of Mines at the time this Bureau was transferred from Interior to Commerce.

Since the war new and more insistent demands for service in the field of mineral economics have arisen because of its obvious need during the war period. The War Department requires much information upon mineral products in connection with procurement and with plans for the national defense. Technical societies and industrial leaders have also requested the government to undertake surveys of world mineral resources and to maintain for the benefit of industry current information upon the world setting of American mineral industries.

There had been perhaps an unavoidable tendency to duplication of effort among the government agencies doing work in the field of mineral economics and it has been recently deemed advisable to consolidate most of the work of this character in a single organization; the Economics Branch of the Bureau of Mines being named for this service.

The branch has been organized with five divisions, among four of which the field of the various mineral commodities has been divided, the fifth being a service division specializing upon the collection and compilation of statistics on all mineral commodities. This division is also entrusted with general supervision of the preparation of the Mineral Resources chapters and volumes, in the writing of which the specialists of the commodity divisions cooperate with statisticians and economists of the service division.

C. P. White

The five divisions of the Economics Branch are designated as follows: Coal Division, Petroleum Division, Common Metals Division, Rare Metals and Non-Metals Division, Mineral Statistics Division.

As the chiefs of these divisions will each discuss the phase of work entrusted to him, I shall say only a few words further in generalization of the task imposed upon the branch as a whole.

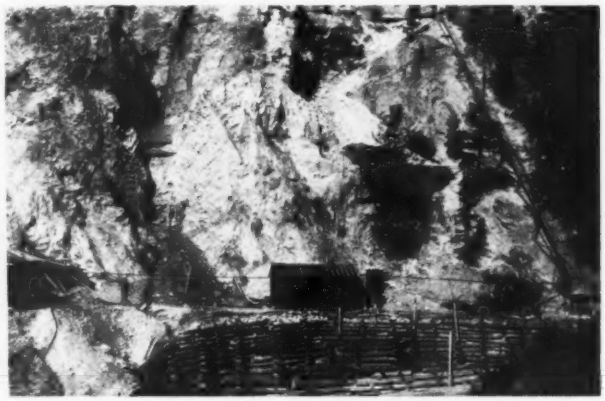
In the first place it is intended that the Economics Branch shall primarily be concerned with assistance of the mineral industries through the furnishing of information for their use in the conduct of their affairs. It will ascertain facts, compile and correlate them as may be necessary, making only more or less obvious deductions, leaving the theoretical and controversial phases of such work to others, except as confidential discussion of such matter may be requested of the Bureau by individuals in their own problems only, or by Congress or the executive departments of the Federal Government.

In regard to each mineral commodity there are two phases of information of equal importance; one furnishing a basic picture of the world status of the commodity; the other the up-to-date facts concerning shifts and changes in conditions affecting the current status of the commodity. The one is perhaps as necessary as the other. Members of the industry who are acquainted only with the fundamentals of a commodity are apt to err through lack of up-to-date information; while those informed chiefly by means of current news items and who lack fundamental knowledge of the industrial background of a commodity are even more susceptible to error. Hence, the Economics Branch will endeavor to cover both these classes of information and to thus present a more or less complete picture of conditions in the mineral industries for the benefit of its members.

In order to furnish information, information must first be obtained, and there are many difficulties connected with getting it, quite (*Continued on page* 628)

* Presented to Thirtieth Annual Convention of The American Mining Congress.

† Chief, Economics Branch, U. S. Bureau of Mines.



Part of workings of molybdenum mine in New Mexico

WORK *of the* DIVISION *of* RARE METALS *and* NON-METALS *of the* BUREAU *of* MINES*

By FRANK L. HESS†

The Chief Function Of This Division Is To Issue Monographic Reports On Various Mineral Substances In Order That The Minerals May Become Better Known, And That Their Uses, Buyers And Sources May Be Available

AS ITS name implies, the work of the Division of Rare Metals and Non-Metals deals with the less common and rare metals and with the non-metallic minerals other than coal, oil and gas. By non-metallic minerals is meant not only minerals of those elements which are non-metals, but also those natural substances which like clay, stone and gypsum are used as chemical and physical compounds.

The Division cooperates with the Division of Mineral Statistics in collecting and publishing statistics of production, distribution and consumption. Especial attention is given to resources, uses, possible markets and possible substitutes.

The uses of the rare metals are comparatively few and are not generally well known; the users may not know the sources, the miners are not apt to know buyers and users, and most do not know the minerals, their associations and types of deposits. It is intended to issue monographic reports on the various mineral substances as the size of Division allows.

The Division tries to introduce producer and buyer to their mutual benefit. It tries to acquaint the prospector and miner with the appearance and types of occurrence of the minerals, the competition at home and abroad. It tries to help the buyer and user by informing them about present and potential sources of the minerals they need. Much care is therefore given to correspondence, and an effort is made to give the prospector and others interested the information each asks in the many letters received. Remembering the duty it owes to the citizens who pay the bills, careful attention is given each letter, and stereotyped replies are avoided because they are generally either unsatisfactory or delusive.

Although under the law assays and analyses may not be made except for investigations carried on by a Government agency, information of value can frequently be given from an inspection of specimens, and this service the Division gladly performs.

The Division has charge of the exhibition of minerals and their products, and an effort has been made to make the work educational by showing minerals, extracted metals and compounds, and the uses to which one or both are put. The exhibit which was shown at the Sesqui-Centennial is now on the second floor of the Bureau of Mines office building. An exhibit of typical ores is in preparation and is to be placed on the third floor.

Mining kaolin in South Carolina

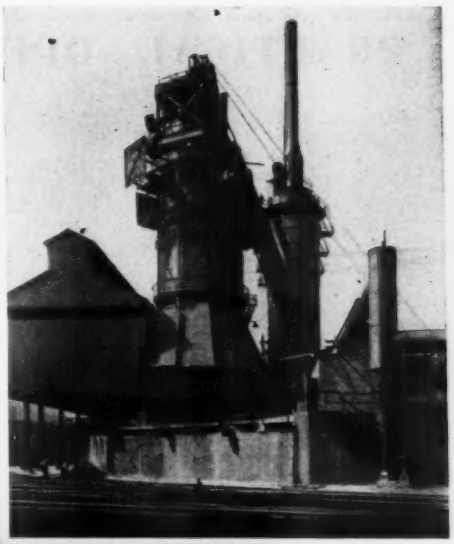
* Presented to the Thirtieth Annual Convention of The American Mining Congress.

† Chief Engineer, Division of Rare Metals and Non-Metals, United States Bureau of Mines.

The METALLURGICAL DIVISION *of the* U. S. BUREAU *of* MINES*

The Work Of This Division Is Allocated Largely To The Experiment Stations, Which Limits Its Activities To Problems That Can Be Conducted By One Or Two Original Investigators—Cooperation Of Industry Has Enabled It To Make Substantial Headway In Spite Of This Handicap

By A. C. FIELDNER†



Work of this department covers studies and processes as widely differing as the roaring blast furnace and the placid leaching basins

THE Metallurgical Division is divided into four sub-divisions, namely, ferrous metallurgy; non-ferrous metallurgy; ore dressing; and non-metallics. Ferrous metallurgical work is in immediate charge of the supervising engineer of the ferrous metallurgical section of the Pittsburgh Station and includes research on steel making at Pittsburgh, and blast furnace and iron ore studies at the North Central Station at Minneapolis, Minn.

Non-ferrous metallurgical research is in charge of the supervising engineer of the Pacific Station at Berkeley, Calif., and includes research at Berkeley on fundamental physical and chemical problems relating to this branch of metallurgy; flotation and treatment of complex lead-zinc and copper ores at the Intermountain Station at Salt Lake City; treatment of copper ores at the Southwest Station at Tucson, Ariz.; and research on the extraction of rare and precious metals at Reno, Nev.

Ore dressing research is in charge of the supervising engineer of the Mississippi Valley Station at Rolla, Mo., and includes field studies of milling problems in the Tri-State zinc district of Oklahoma, Kansas and Missouri, milling of southeast Missouri lead ores, milling of fluospar in Illinois and Kentucky; beneficiation of low-grade bauxite in Alabama, Georgia, Tennessee and Mississippi; and beneficiation of phosphate rock of Tennessee and Florida. The bauxite and phosphate investigations are conducted at the Southern Experiment Station at Tuscaloosa, Ala. One detached investigator on ore dressing and gravity concentration is stationed at the University of Idaho, Moscow, Idaho, to work on the problems of the Coeur d'Alene district.

Research on non-metallics is in charge of the supervising engineer of the non-metallic station at New Brunswick, N. J. Elimination of waste in slate quarrying and in the mining and preparation of mica, limestone and gypsum mining and burning, and the extraction of potash are some of the present problems of the station.

Coal-washing research is the principal problem of the Northwest Station at Seattle, Wash., although this work has not been limited to the coals of the Northwest, but has extended as far as Colorado coals during the past year. Next year it is proposed to transfer the coal-washing engineer to the Tuscaloosa (Ala.) Station to work on southern coals.

FERROUS METALLURGY

The ferrous metallurgical investigations now in progress come under three heads: First, a study of reactions and conditions prevailing in the iron blast furnace; second, utilization of manganiferous iron ores; and, third, the physical chemistry of steel making. The first two studies are being conducted at the Minneapolis Station, and in commercial blast furnaces at various points. The third problem is being studied at Pittsburgh in cooperation with the Carnegie Institute of Technology and an advisory board representing the iron and steel industry.

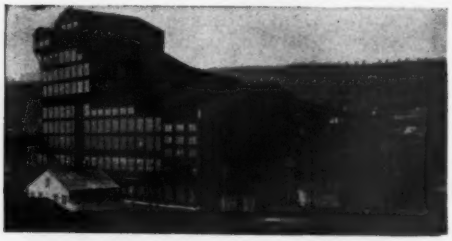
Blast Furnace Studies: For many years the iron blast furnace has been regarded as a highly temperamental piece of equipment, which must be petted and humored with coke of just the right quality in order to keep it functioning properly. No one but the furnace superintendent himself could interpret its moods, and he could not record or explain these moods to others, nor could he agree with other furnace operators on what constitutes good furnace coke. One says the coke should be highly combustible, another wants low solution loss in carbon dioxide and a third wants uniform size. Obviously, the trouble is that no one knows how the stock and gases flow in the furnace or where the coke is consumed.

To fulfill this need for information, the Bureau of Mines began the study of blast furnaces several years ago. With the aid of the State of Minnesota an experimental blast furnace was installed at the Minneapolis Station, and studies were made with several commercial furnaces. The first commercial furnace investigated was a 300-ton furnace in Alabama; the second was a 700-ton furnace in the Chicago district; and the third was a 500-ton furnace in Utah. As a result of this work, the coke consumption per ton of pig iron made at the last-named furnace was reduced 200 pounds. Also, modifications are being made in the methods of charging stock that are expected to introduce further economies.

The experimental blast furnace and the experimental open-hearth furnaces at Minneapolis (*Continued on page* 628)

* Presented to Thirtieth Annual Convention of The American Mining Congress.

† Acting Chief Engineer, Metallurgical Division, United States Bureau of Mines.



COAL

NEWELL G. ALFORD
Editor

Practical Operating Problems of the Coal Mining Industry

ASHLAND COAL & COKE COMPANY TIPPLE *and* WASHER

By H. D. SMITH*

THE Ashland Coal & Coke Co., Ashland, W. Va., is operating in the Pocahontas No. 3 seam of coal located in the heart of the Pocahontas Coal Field, being about 20 miles from Bluefield, W. Va.

With the view of better preparing the different grades of coal shipped both from a sizing and cleaning standpoint this company decided to build one of the latest types of tipple and washery in order to accomplish the above purpose. Contract was let to the Pittsburgh Coal Washer Co., Ambridge, Pa., to build a combined sizing and cleaning plant, steel and concrete structure.

Ashland tipple from down track

Five Sizes Of Coal Made And Cleaned At This Plant—A Complete Description Of The Plant And Equipment—Results Entirely Satisfactory And Product Meets The Exacting Demands Of Present Market

Five sizes of coal are made and cleaned in this plant: lump, egg, stove, nut and slack—with the reassembling size of run-of-mine. As the available ground space was limited, it was found that room for only four tracks could be obtained and therefore bins would have to be provided for one size, the other sizes going directly to the railroad cars as made.

By referring to the accompanying Plan and Elevation Section AA, the flow of coal from the mine cars to the railroad cars can be traced. The coal is brought in mine cars in trips, averaging forty cars, to the trip puller located in a steel constructed head house and shed. This trip puller is a chain type puller with trip dogs fastened to the chain which engage in angles under the mine cars which move the cars forward at a rate which gives a dumping rate of 350 tons per hour.

A standard cross-over dump is used at the dump and after dumping the empty cars run by gravity to a trip maker which pushes the empty cars ahead until the empty trip is assembled and ready for the main line locomotive.

The steel shed at head house covers both the trip puller, dump and trip maker, thereby keeping snow and ice from clogging the machinery, and protecting the men from rain, etc.

The coal after dumping flows into a dump hopper of approximately 7-ton capacity, under which is a pan conveyor feeder which feeds the mine run coal at the rate of 350 tons per hour onto an apron pan ROM conveyor about 180 ft. long bringing the coal down the hillside to proper height for discharging to the main shaker screens. At the discharge point of the ROM conveyor there is a receiving chute which delivers the coal to the shaker screens and which contains a fly gate which can be opened to allow the loading of ROM direct into the railroad car through an emer-

*Assistant to the President, Ashland Coal & Coke Co., Bluefield, W. Va.

gency ROM chute onto the slack track.

The main shaker screen is in two sections for balanced operation. The top section has two screening decks, using 2½-in. round perforation on top deck over which the lump and egg travel until the second section is reached which has 5-in. round perforation, the egg size 2½ by 5 in. drops through and is placed on the egg picking table, and the over 5-in. size going off to the lump picking table.

The lump and egg picking tables are shown in "Section CC," starting at point marked "Lower shaker screen." They are of the apron pan type giving 64 ft. of picking space for pickers on both the egg and lump tables, which is found more than necessary to properly pick these two grades.

Provision has been made for double refuse boxes for the pickers, one side for bony coal with pure coal adhering to same, and the other for slate. The slate from refuse boxes goes direct to the refuse conveyor and to a refuse bin which also receives the refuse from the washer building and from there to a refuse car which is hoisted up the hillside and dumped in a refuse bin. From the top refuse bin the refuse is discharged into an electric operated refuse car and trained along the hillside and discharged over a refuse dump.

The bony coal picked out of the lump and egg sizes is put in the bone side of the double refuse box and is discharged into top strand of the No. 2 conveyor section "CC," which is a flight conveyor, and taken back to a crusher where it is crushed down to sizes minus 2½-in. After being crushed it falls into the bottom strand of the No. 2 conveyor and is brought forward to the No. 1 conveyor located on center line of tipple shown on "Section CC" and also shown as No. 1 conveyor on Elevation Section "AA." By referring to Section "AA" this crushed coal and bone is put on the lower strand of the No. 1 flight conveyor and travels back toward the hillside to a point between bents "4 and 5."

Referring back to the main shaker screen first section, the coal from the ROM conveyor that passes through the 2½-in. screen plates is taken off the screen and by means of chutes is discharged also into the bottom strand of the No. 1 conveyor with the material from the crusher as described above. This coal, now all minus 2½-in. in size, being on the bottom strand of No. 1 conveyor, travels to a point between bents 4 and 5 as shown on Section "AA," where it is dropped into a cross-flight conveyor marked "Raw Coal Conveyor Section DD." This takes this coal to the washer part of the structure for treatment.

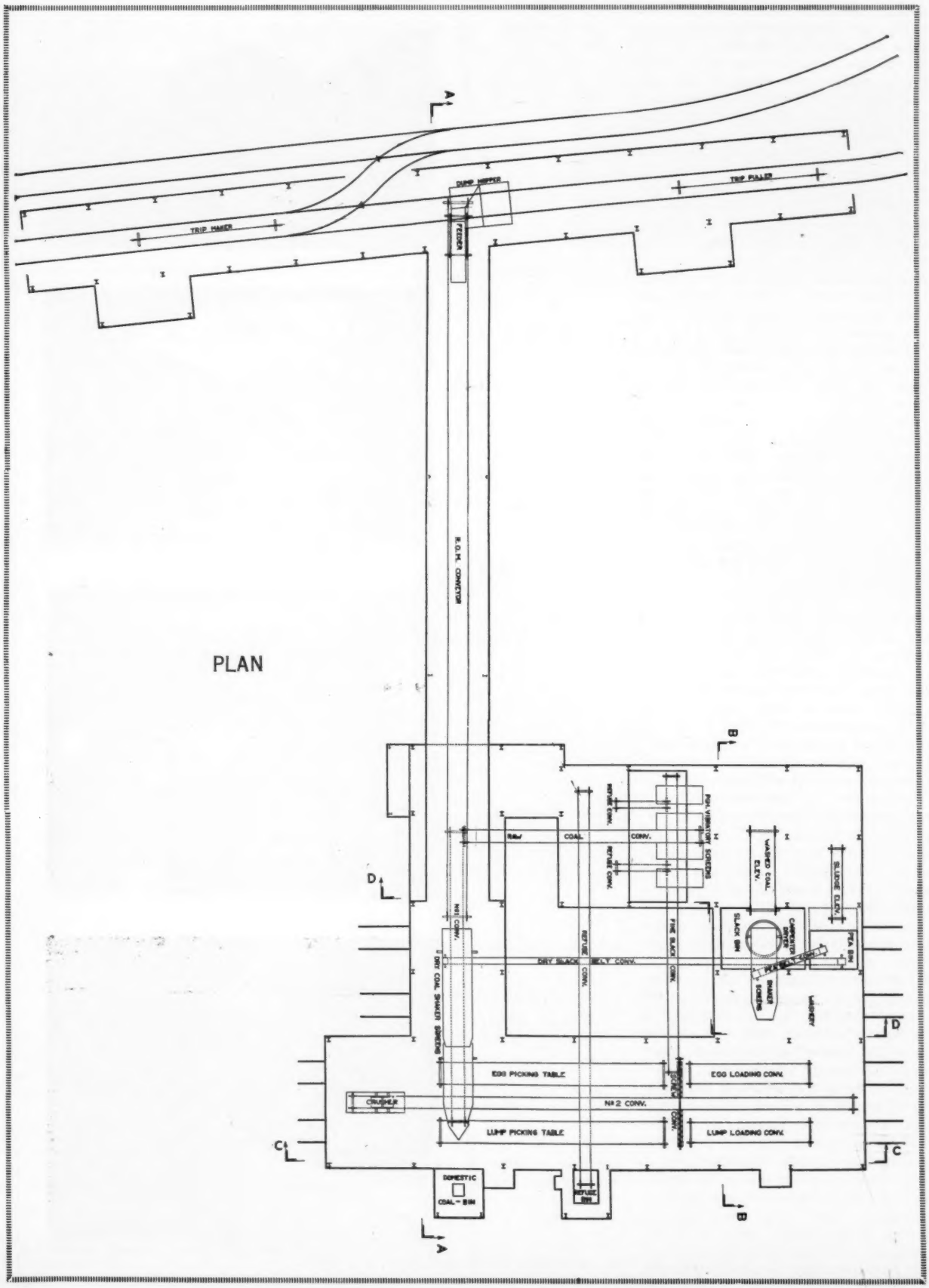
Referring back to the lump and egg picking tables, after these sizes are picked the coal goes off these tables and over bar degradation screens where any

Ashland tipple from up track

Picking table room showing lump and egg coal picking tables

Main sizing screen for lump, egg and stove

View in jig room showing jigs and dewatering elevator


TRIP MAKER
DUMP HOPPER
FEEDER
TRIP PULLER
R.O.M. CONVEYOR
PLAN
RAW COAL CONV.
PICK VIBRATORY SCREENS
WASHED COAL ELEV.
SLUDGE ELEV.
SLACK BIN
CARBONATOR DRYER
PEA BIN
DRY SLACK BELT CONV.
PEA BELT CONV.
BAKER SCREENS
WASHERY
DRY COAL SHAKER SCREENS
REFUSE CONV.
FINE SLACK CONV.
EGG PICKING TABLE
EGG LOADING CONV.
CRUSHER
No 2 CONV.
LUMP PICKING TABLE
LUMP LOADING CONV.
DOMESTIC COAL - BIN
REFUSE BIN

Ashland store and camp

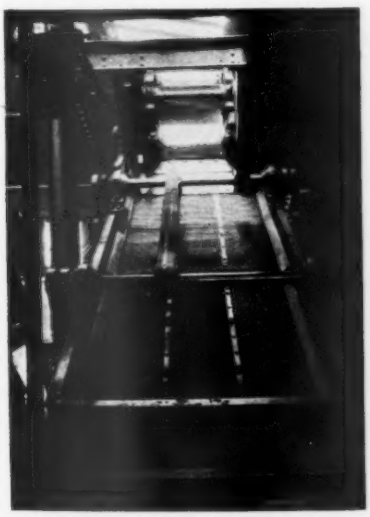
Main street in camp

fines that have been made during picking are taken out before the lump and egg reach the loading booms. This insures,

Laboratory at Ashland

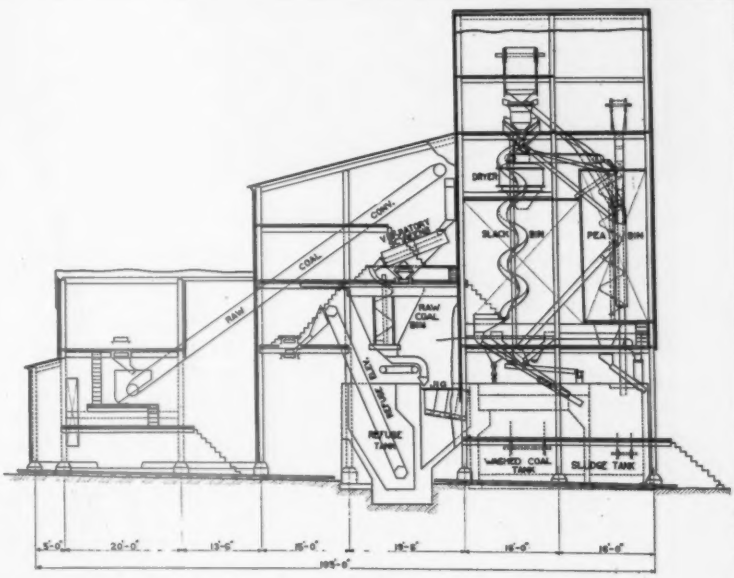
after final handling, a lump and egg coal free from any fine slack at time of loading over loading booms to the railroad cars.

The rescreens that have been taken out from the lump and egg before going to the loading booms are taken by means of a screw conveyor across to the washed coal tank, joining the washed fine coal at that point.

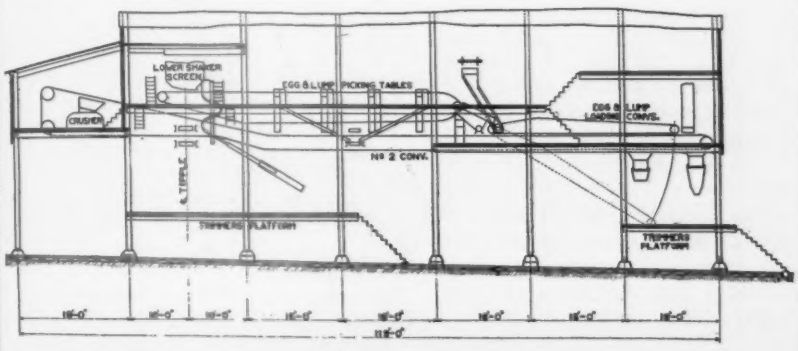


Looking down on the Pittsburgh vibratory screen

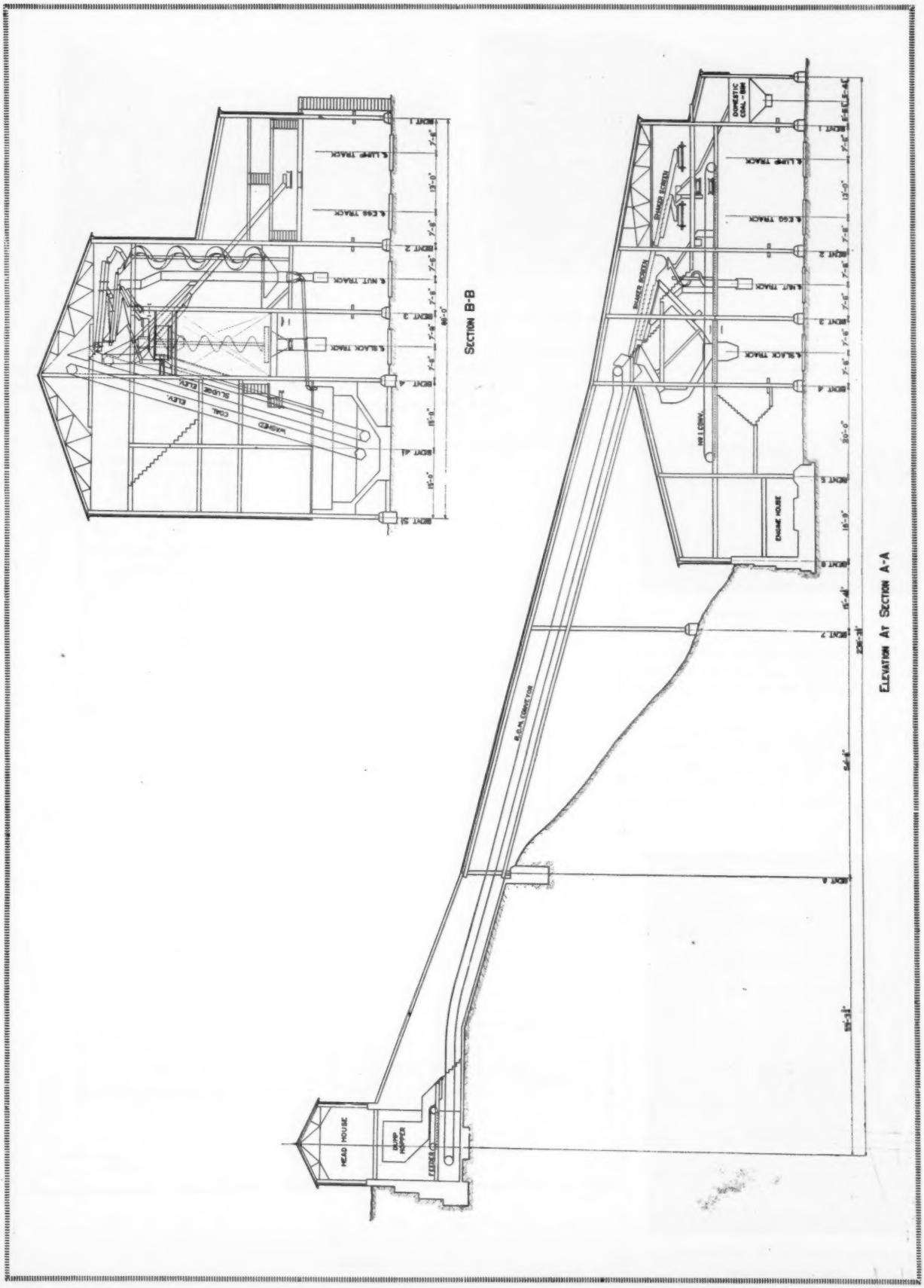
Returning to the minus 2½-in. size coal on the Raw Coal Conveyor Section "DD," this coal is elevated up to a point high enough for proper discharge to four Pittsburgh vibratory screens. These screens are of the double decked vibratory type, the top deck acting as scalping screens using a 3/8-in. ton-cap cloth, and



SECTION D-D



SECTION C-C


SECTION B-B
ELEVATION AT SECTION A-A
DOMESTIC COAL-BIN
ENGINE HOUSE
HEAD HOUSE
DUMP HOPPER
FEEDER
SHAKER SCREEN
WASHED COAL CONVEYOR
6 LUMP TRACK
6 EGG TRACK
6 NUT TRACK
6 BLACK TRACK
SLUDGE ELEV.
WASHED COAL ELEV.

the bottom deck having ¼-in. square clear opening cloth, the screens being used to remove the minus ¼-in. coal which by-passes the washer and allowing the 2½ by ¼-in. sizes to be wet washed.

Under each screen there has been provided lowering spirals to place this 2½ by ¼-in. coal into the raw coal bin with minimum breakage. Under the raw coal bin there are four apron pan feeders which take the 2½ by ¼-in. coal to four Pittsburgh jigs for wet washing this size.

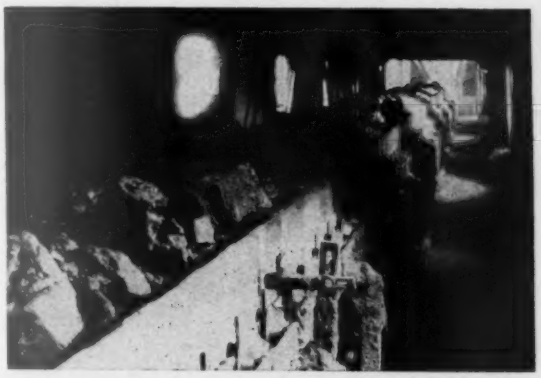
By referring to section "DD" it will be seen that the coal passes from these feeders to the jigs; the clean coal from jigs with circulating water goes into the washed coal tank which is built of concrete. The refuse from the jigs is dropped out of the bottom of the jigs to a concrete refuse tank from which it is taken by two refuse elevators with dewatering buckets up to a point where it is discharged into the main refuse conveyor coming over from the lump and egg picking house as shown in "Plan" and in cross-section in Section "DD."

The 2½ by ¼-in. coal, which has now been washed, is picked up out of the washed coal tank by a large washed coal elevator shown in section "BB," also "DD," having on same large perforated buckets for dewatering this size, and is lifted up to the top of the washer building and delivered on a set of high speed wet shaker screens as shown in section "BB."

These shakers make three sizes, 2½ by 1¼-in. washed stove, 1¼ by ⅝-in. washed nut, and ⅝ to ¼-in. coal, which size is put into a Carpenter centrifugal drier; the minus ¼-in. wet size coming off the shaker screen is dropped to the sludge tank, from where it is elevated and dewatered by a dewatering sludge elevator.

A concrete slack bin is provided under the Carpenter drier into which the dried coal ⅝ by ¼-in. can be delivered. The 1¼ by ⅝-in. nut can either be delivered from the wet shaker by a belt conveyor to a concrete nut bin or delivered to the slack bin and mixed with the ⅝ by ¼-in. coal from the drier. The wet washed coal from the slack bin is then delivered by a chute to the chute from the fine dry slack conveyor from the vibratory screens, and the dry ¼-in. with the ⅝ by ¼-in. washed shipped as slack or with the 1¼ by ⅝-in. washed nut and shipped as nut and slack.

Spirals have been provided to lower the washed stove coal size 2½ by 1¼-in. from the wet shaker screens to the stove rescreen just above the loading point to the railroad car. The nut size 1¼ to ⅝-in. when binned is lowered by spirals in this bin to prevent as far as possible any breakage.



Looking up ROM conveyor bringing coal from mine car dump to main screen

Lump loading boom loading railroad car

When reassembled ROM is desired this size is loaded over the lump loading boom.

By referring to section "CC" and "BB" the egg coal after picking drops off the end of the egg picking table to a fly gate before reaching the egg rescreen and is diverted by this fly gate to the lower strand of the No. 2 conveyor where it is brought forward and joins the 2½ by ¼-in. wet washed coal, which comes down through a chute from the head of the dewatering clean coal elevator. The minus ¼-in. dry slack is brought over to the No. 2 conveyor by the fine slack conveyor as shown in plan. Thus all the coal below 5 in. in size is joined with the lump and a mixture made at the end of the lump boom containing percentages of sizes as is contained in the mine cars, as no coal is binned during the time ROM coal is being loaded.

In the entire design of this tipple special attention was made to the proper handling of the prepared sizes with view of minimizing the breakage of coal in transferring from screens to tables, to chutes, etc. and having all sizes rescreened before going to the railroad car.

At the Ashland plant there is a fully equipped laboratory for running proximate analysis on coal, sink and float machine, Ro-tap screen testing machine, proper scales, etc., in which daily samples are run to keep a close check on the performance of the washer as well as to the condition of the clean coal as shipped.

The results from this plant have been very satisfactory and have insured a product well prepared for the most exacting demands of the present market.

ANTHRACITE PRODUCED IN 1927

According to figures just issued by the Department of Commerce, Washington, D. C., the production of anthracite during the calendar year 1927 amounted to 71,513,896 gross tons. The value of this tonnage, which is based on the price at which coal was sold by the producing company, f. o. b. mines, not including margin of separately incorporated sales agencies, amounted to $420,941,726. The total production was made up of 62,942,220 tons shipped to market, at a value of $401,146,626; local sales amounting to 2,720,330 tons, valued at $13,519,384, and colliery fuel amounting to 5,851,346 tons, valued at $16,275,716. The total breaker production during the year is shown at 69,140,369 tons, valued at $416,507,933; washery production, 1,505,833 tons, valued at $3,638,986, with dredge coal amounting to 867,694 tons, valued at $794,807.

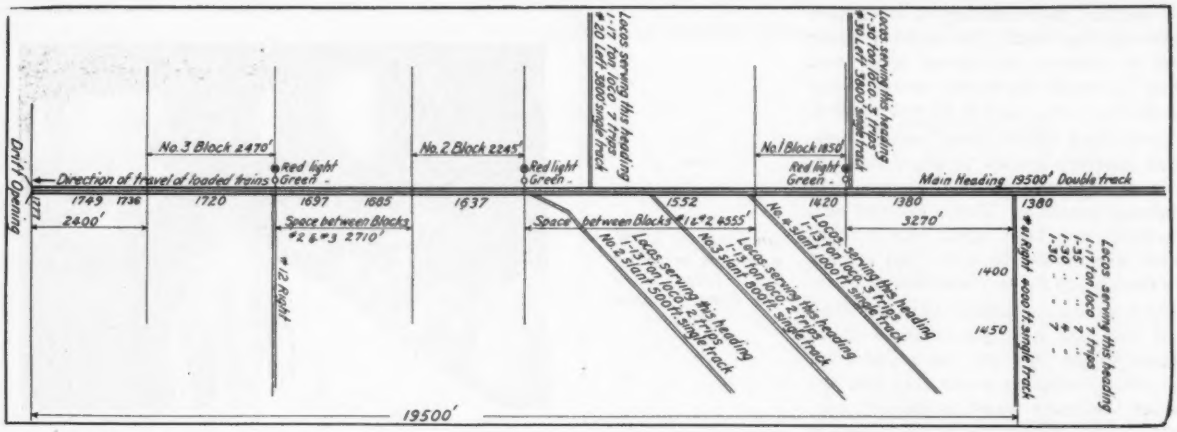

Drift Opening
No. 3 Block 2470'
Red light Green
Direction of travel of loaded trains
No. 2 Block 2245'
Red light Green
Locos serving this heading 1-17 Ton loco. 7 trips #30 Left 3800 single track
No. 1 Block 1850'
Red light Green
Locos serving this heading 1-30 Ton loco. 3 trips #30 Left 3800 single track
Main Heading 19500' Double track
1749 1736 1720 1697 1685 1637 1552 1420 1380 1380
2400' Space between Blocks #2 & #3 2710' Space between Blocks #1 & #2 4555' 3270'
#12 Right
#11 Right
Locos serving this heading 1-3 Ton locos 2 trips No. 2 Slant 5100ft. single track
Locos serving this heading 1-3 Ton locos 2 trips No. 3 Slant 6000ft. single track
Locos serving this heading 1-3 Ton locos 3 trips No. 4 Slant 10001 single track
1400
1450
Locos serving this heading 1-17 Ton loco 7 trips 1-30 " " 7 " 1-30 " " 7 "
19500'

Figure 1—Express haulage system, Eureka Mine No. 36, Berwind-White Coal Mining Co., Windber, Pa.

AUTOMATIC BLOCK SIGNALS *for* MINE HAULAGE SYSTEMS

By C. E. WATTS*

Safe Control, Speed And Efficiency Of Train Movements Becomes Paramount Feature Of Haulage System Which Embraces Long Line Of Double Track With Its Necessary Crossover Connections And Side Tracks—A Description Of A System Which Has Proved A Valuable Feature In Protection Against Collisions, Increased Speed Of Trains And Controlled Peak Loads

WHEN a haulage system embraces a long main line of double track with numerous crossover connections between them and with side tracks leading off to right and left at frequent intervals, over which long trains of empty and loaded cars on their way into and out of the mines pass almost incessantly during working hours, the matter of safe control, speed and efficiency of train movements becomes a paramount feature of the system.

In the nature of the service of such a system, maximum speed and train weight are required, because the minimum number of locomotives to handle the tonnage should, in the interest of best economy, be employed, and even when such provisions are made trains travel in comparatively close proximity to one another. Difficult grades often are encountered which require the exertion of maximum draw bar pull by the locomotives, and the bunching of numerous trains on grades would precipitate excessive peak loads at the source of power supply.

The haulage ways as a rule are low and narrow, thus limiting the top and side clearance for the passing trains to very small distances. Correct positions of crossover and side heading switches to handle the traffic must at all times be maintained.

Constant darkness prevails except for incandescent lights located at infrequent intervals along the headings, and the beam from the locomotive headlight, which latter, on account of the small cross sectional area of headings, grades and curves encountered, seldom lights the track for any considerable distance from the locomotive. The presence of more or less dust thrown into suspension and carried along the road by passing trains and the ventilation current make visibility poor and uncertain. To operate trains under such conditions requires, in the interest of reasonable security against danger of wrecks with possible loss of life and property, the best protective devices for indicating switch locations and positions, train positions and movements that can be obtained.

In some systems, switch positions are indicated by the use of switch lamps with red and green or white lens (similar to those used in regular railroad service) attached to parallel throw switch stand mechanism and operated by train crew under direct verbal or telephone instructions from a train dispatcher. Train movements are, in a general way, determined by verbal instructions transmitted by the train dispatcher to the train crews when they start into the mine with an empty trip, and also by telephonic communication through stations located at convenient points underground. Such methods of control, when carefully worked out, properly installed and accurately handled, give very good results. Troubles of various kinds and degrees of seriousness, however, can and do occur, as the human element in this as in any other service is not infallible, and in so far as reliable automatic features for control in a system of this kind can be employed, added safety and economy will result.

Automatic signal systems can be used in connection with automatic mine doors and switch throwers if desired, or to operate a "block signal system" enabling

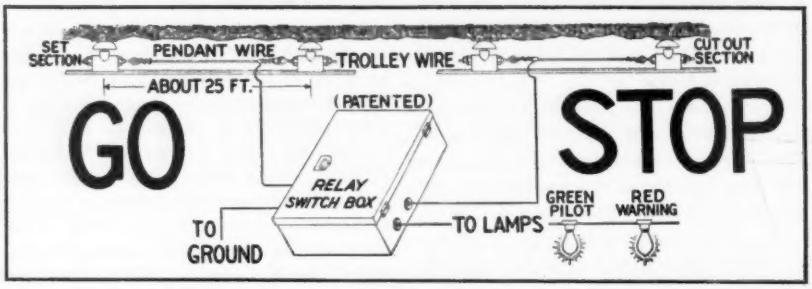


Fig. 2—"Go" and "Stop" with relay switch box

*Mechanical Engineer, Berwind-White Coal Mining Co., Windber, Pa.

trains to enter, leave or pass crossings or turnouts, run at maximum speed over blind or long stretches of single track with a degree of safety and economy impossible to obtain by the system of telephone dispatching, and manually operated signals alone.

A block signal system in one of the large mines of The Berwind-White Coal Mining Co., at Windber, Pa., is described below:

Its purpose in this instance is to minimize the chances of collisions, increase the speed of trains, reduce peak loads on substations and eliminate some of the expense of manually operated signalling apparatus over the lines of track on main and side headings, which constitute this express haulage system and whose outline is shown on Figure 1.

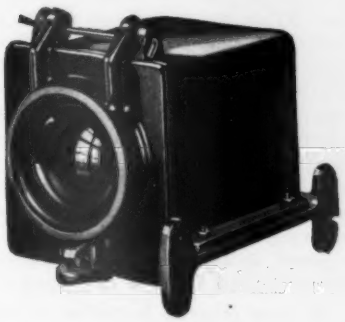


Fig. 4—Signal light

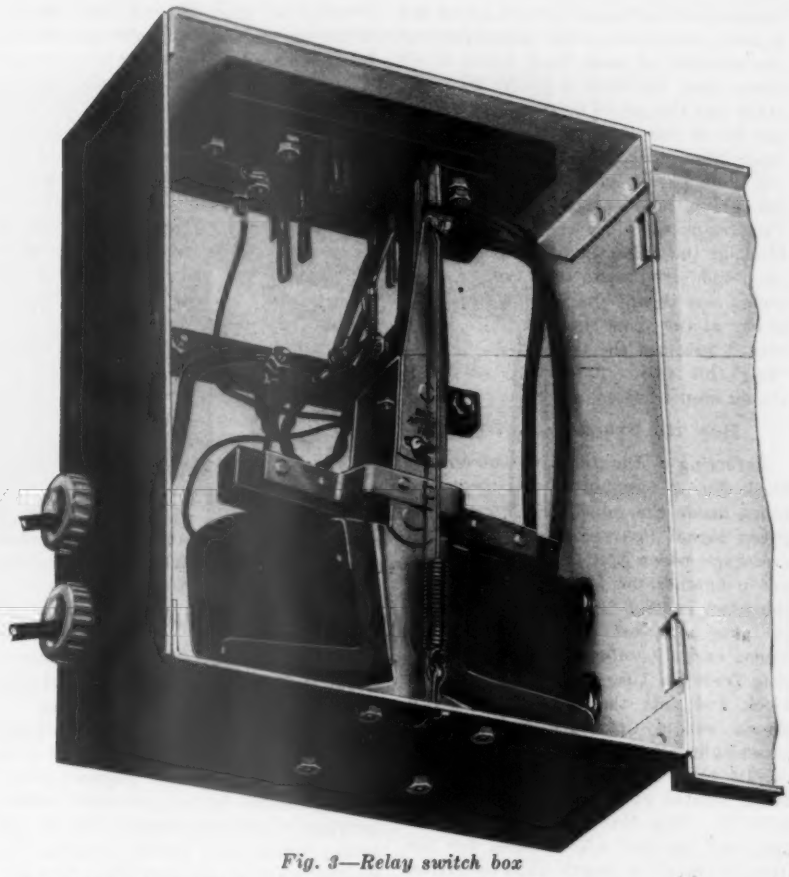


Fig. 3—Relay switch box

Description of Haulage System Shown in Figure 1

The 4-mile long main heading is double tracked with 70-lb. rail for its entire length. Standing facing the drift opening the right-hand track is for the ingoing trains of empty cars, the left-hand track for the outcoming trains of loaded cars.

The side headings 2d, 3d and 4th slants, and No. 41 right branching off from this right side of the main contain, respectively, 500, 800, 1,000 and 4,000 ft. of single track. The side headings Nos. 20 and 30 left, branching off from the left side of the main, each contain 3,800 ft. of single track. All side heading tracks are of 50-lb. rail. Track gauge — 36. in. Height of coal seam—42 in.

Power in the form of 550-volt direct current supplies one 35-ton, two 30-ton, one 13-ton and two 17-ton locomotives, each of which make seven round trips or a total of 42 loaded and 42 empty trains transporting a total of 3,000 tons of coal per 8-hour day over this system. The headings from which each of these locomotives haul, the number of trips hauled daily and the grades are also shown in Figure 1.

To best accomplish the previously mentioned objectives it was found necessary to establish three "blocks" on the loaded track of the main heading, each block entirely separate and independent of the other. Side by side at the entrance of each block red and green signal lights are installed. These lights are automatically controlled by the entrance of a train into and its passage out of the "block" as hereinafter described:

The length of the "blocks" and the spaces between them are so arranged as to keep the trains separated at a distance which permits maximum speed and at the same time avoids having too many trains on heavy grades at the same time, thereby preventing objectionable peak loads on sub-stations. Therefore, these dis-

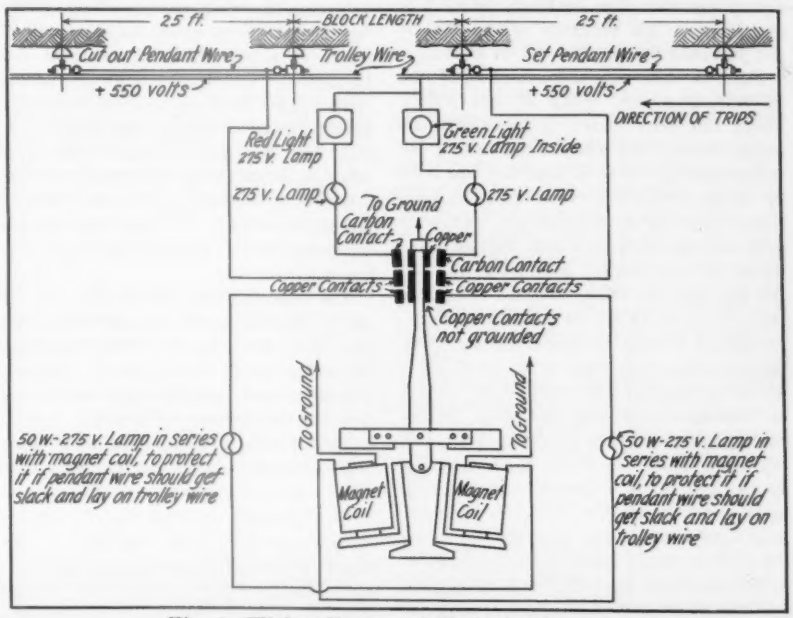

25 ft.
BLOCK LENGTH
25 ft.
Cut out Pendant Wire
Trolley Wire
Set Pendant Wire
+ 550 volts
+ 550 volts
DIRECTION OF TRIPS
Red Light 275 v. Lamp
Green Light 275 v. Lamp Inside
275 v. Lamp
To Ground
275 v. Lamp
Carbon Contact
Copper
Carbon Contact
Copper Contacts
Copper Contacts
Copper Contacts not grounded
To Ground
To Ground
50 w.-275 v. Lamp in series with magnet coil, to protect it if pendant wire should get slack and lay on trolley wire
Magnet Coil
Magnet Coil
50 w.-275 v. Lamp in series with magnet coil, to protect it if pendant wire should get slack and lay on trolley wire

Fig. 5—Wiring diagram of block signal system

tances are determined by train speed and grades encountered. The green light at the entrance of each block burns at all times when the block is unoccupied by a train and the green light is replaced by the red at the instant a train enters the block, the red continuing to burn until the train passes out of the block, when the green is automatically set again. Two trains therefore cannot occupy the block at the same time, unless one runs by a red signal, although two or more trains may occupy the space *between* the blocks at the same time, in which latter case it becomes the trip rider's duty to "flag" his train if for any reason it should stop between blocks.

How the System Functions

Referring to Figure 1, the entrance to block No. 1 (located the furthest distance inside the mine) and its red and green signal lights are at No. 30 left crossover, which is at the foot of a heavy grade against the loads; the exit from this block is 1,850 ft. from this entrance. It takes a 35-ton locomotive with 50 loaded cars 3½ minutes continuous running from the time the train enters the block and sets the red light until it passes out of the block and sets the green light. From the point of exit from the 1st block to the entrance of the 2nd block, located at 2nd slant crossover is 4,555 ft. This No. 2 block is 2,245 ft. long and requires 4¾ minutes for the train to travel its length, thus operating the red and green lights located at its entrance. From the point of exit of the 2nd to the entrance of the 3d block, located at 12 right, is 2,710 ft. This No. 3 block is 2,470 ft. long and requires 4 minutes for the train to travel its length, operating the red and green lights at its entrance. The time required for train to travel the distances between the exit of one block to the entrance of the next is not included in the time given above.

Suppose there is a train in 41 right and 30 left, and they reach 30 left switch about the same time; if there was no block system they would travel along the main heading too close together and both be on the hill at the same time, but with these signal lights working the train that gets into the block first sets the red light, which will not change until he is up over the hill and out of the block. The same thing happens at No. 20 left and 12 right, or should a trip be much lighter than the one ahead the light trip would catch up to the heavier and would have to run on resistance, but with this block system the lighter rear train would have to stop and wait until the train ahead set the green light for it to proceed, thus so controlling the spacing of trains as to maintain maximum speed and at the same time often avoid running on resistance.

The red light for "stop" and the green one for "go" are just ordinary colored "bull's-eye" glass in cast iron boxes in which a regular 50-watt incandescent lamp is placed. They could be very easily changed to "Stop" and "Go" or any other desired signal indicator. Under the mining law a locomotive must not pass a red light, so these cast iron boxes with the red and green signal lights are set side by side just far enough beyond the automatic block signal switch that the locomotive will be past the lights before the trolley wheel, which trails pretty well back towards the rear of the locomotive, engages the block signal switch contact and changes the light from green to red; the light will then remain red until the trolley wheel operates the block signal switch contact at the exit end of the block, when the red light is changed to green, denoting that the block is empty and the next train can enter.

What makes the system function? It is operated primarily by the trolley wheel of the locomotive making a contact between trolley and "pendant" wires.

An outline of the system is shown in Figure 2.

Above the trolley wire for a distance of about 25 ft. at the entrance and exit ends of the block is suspended, between two specially designed insulating clamps which are substituted for regular trolley clamps, a tightly drawn "pendant wire," which provides for an automatic contact between it and the trolley wire by the trolley wheel as it passes, pressing the trolley wire up against this "pendant wire." The "pendant wire" at the entrance end of the block is called the "set section" and serves to make the electrical contacts which sets the red signal light. The "pendant wire" at the exit end of the block is called "cut-out section" and serves to make the electrical contact which changes the signal light from red to green, thus clearing the block. Switching lights from green to red and vice versa is accomplished by current from trolley wire passing through the pendant wire (when the trolley wheel makes contact between them) to the relay switch box, Fig. 3, which contains suitably arranged magnetizing coils and electrical contacts to switch the red and green signal lights on and off in synchronism with train position at entrance and exit of the block.

The signal lights themselves are contained in substantial cast metallic boxes, Fig. 4, with red and green semaphore lenses, in which a light bulb is attached, and so placed that the light will be cast towards the coming train only.

The detailed arrangement of wiring as adapted to the foregoing described block signal system is shown in Fig. 5.

In this case on account of the high voltage carried on trolley lines, it was found necessary to insert a 50-watt, 275-volt lamp in series with each of the two magnet coils of the relay switch as a protection to coils in case the current remained on the coils for an extended period of time.

This signal system was installed in August, 1927, and it has functioned satisfactorily and proved a valuable feature in added protection against collisions, increasing speed of trains and controlling peak loads on this haulage system.

RESEARCH PROGRAM AT CARNEGIE

A program of 14 research studies in coal mining and metallurgy will be carried on during the year of 1928-1929 under the joint auspices of the Carnegie Institute of Technology, the United States Bureau of Mines, and two advisory boards of mining and metallurgical engineers and executives, it is announced. To make the investigations 11 college graduates have been appointed to research fellowships, and, in addition, a research engineer, an assistant research engineer, and an analyst have been engaged.

The new program is similar in scope to those of the past few years that have been conducted under the same auspices. The research fellows, in carrying out their investigations, will be candidates for the degree of master of science to be awarded by the Institute of Technology in June, 1929. The reports of the studies will probably be published as in the past.

Coal Mining

1. Relation of particle size and temperature rate of burning; characteristics of flames of powdered coke and coal. 2. The composition of the oils and heavy tar from the distillation of coal at low temperatures. 3. Forms of sulphur in the Pittsburgh coal bed. 4. The chemical constitution of regenerated ulmins. 5. Effect of fusian and related inerts on the properties of Pittsburgh coal with particular reference to coking properties. 6. Chemistry of decay in relation to peat and coal formation.

Metallurgy

1. A study of the cause and control of adnormality in case carburized steel. 2. Formation and identification of inclusions. 3. Distribution ratio of iron oxide between slag and metal. 4. Method of determining inclusions. 5. Viscosity of open-hearth slags, and three studies in plant work relating to the physical chemistry of steel making.

Four of the studies will be financed by the Carnegie Institute of Technology, six by 29 contributing companies representing the metallurgical industries, one by the International Combustion Engineering Corporation, one by the National Coal Association, and two by the Pittsburgh Coal Company.

Ballistic pendulum used by the U. S. Bureau of Mines to determine the "coal getting" strength of an explosive

NECESSITY *for the* USE *of* SHORT-FLAME EXPLOSIVES*

By T. E. JENKINS†

While The Question Of Whether Black Powder, Or Short-Flame Explosive Shall Be Used Is One That Should Be Determined By The Individual Responsible At Each Mine, The So-Called Flameless Powders Should Be Used Exclusively In All Mines Where Methane Is Present And In A Great Many Mines Where It Is Not

THE question of whether short-flame powders are needed when explosive gas is absent is affected by conditions which vary materially in one mine as compared with another, so that it is difficult to answer the question with a positive statement of "yes" or "no."

I do not think there is any question but that all practical men will agree that in very dry, dusty mines that a material hazard exists from using long-flame powders, regardless of the presence of methane, as many explosions, destructive to life and property have occurred in mines where gas has never been discovered in quantities sufficient to show on a safety lamp. I think it will also be agreed to without argument that the undercutting of coal with mining machines only minimizes the danger of blown-out shots and does not eliminate it.

The danger of explosions from blown-out shots is materially less with short-flame powders than with black powders, so I do not see that there can be any argument against the statement as a general proposition that permissibles, or flameless, powders will materially lessen the hazard in all mines, regardless of whether the mine produces methane or not.

The fact that to date no permissible or short-flame powder has been produced which can be used with the same result in the way of securing a high percentage of lump and a low percentage of screenings in all seams that can be secured with black powder, and the wide range between the return from prepared sizes, as compared with the price of slack, makes it a serious matter to adopt flameless powder in seams where the hazard from the use of black powder is not so great as to make its exclusion imperative for safety.

In the final analysis it appears to the writer as though this question should be one for individual determination at each mine. With an entire absence of methane in discoverable quantities, proper attention to the elimination of dust hazards by cleaning and rock dusting and careful supervision of the use of explosives, the use of black powder is reasonably safe and desirable. Without proper attention to the elimination of conditions which make its use hazardous, regardless of the presence of methane, short-flame powder should be adopted.

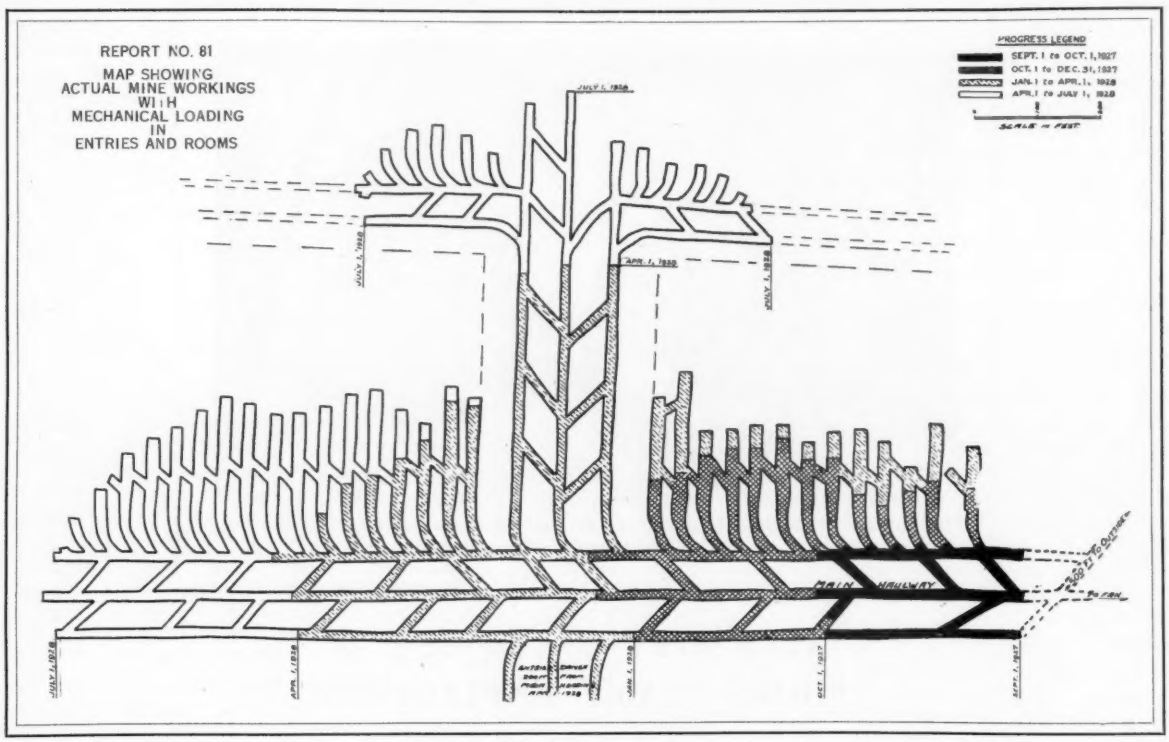
Many of us have learned by experience that the continued use of black powder in mines generating methane, even when explosion hazards are eliminated by thorough ventilation, cleaning the mines of dust and rock dusting, regardless of the improvement in the production, has been expensive. The cost of extinguishing mine fires and the hazard therefrom has not been paid for by the added return from the black-powder product.

The writer is convinced that short-flame powders should be used exclusively in all mines where methane is present and in a great many mines where it is not.

The summer meeting of the Rocky Mountain Coal Mining Institute will be held at Rock Springs, Wyo., on August 27, 28 and 29. The next winter session has been scheduled for Salt Lake City, Utah.

* A part of the general discussion carried on by The Mining Congress Journal since January, 1928, concerning necessity for the use of the so-called short-flame explosives as against the use of black blasting powder.

† Vice President, West Kentucky Coal Co., Sturgis, Ky.



MECHANIZATION REPORT NO. 81

By G. B. SOUTHWARD

THE operation described in report No. 81 is in a mine having a seam from 6 to 7 ft. thick, which is worked entirely by mechanical loading in the room and pillar system. This coal company first installed a loading machine several years ago to work rooms in a section of one of their hand mines and to determine whether mechanical loading was practicable and economical. The experimental operations indicated that there was a saving in labor over hand mining, but the machine was used more or less in conjunction with hand loading, and it was soon discovered that mechanized and hand loading each require their own methods and practices, which are difficult to coordinate into a satisfactory joint operation. It was the conclusion of the officials of this coal company that mechanized loading, to be successful, must be carried on in a mine or a section of a mine entirely by itself.

Accordingly, it was decided to develop a new mine which would be worked entirely by mechanical loading; a new drift was opened and a new tipple was built. This construction was completed, and the main entry development was started with a mechanical loader about one year ago, and the mine has worked entirely with mechanized loading since that time.

The map which is submitted with this article shows the present mine workings and the progress which has been made in the development in the last 10-month period. The right-hand edge of the map shows the position of the main entries as of September 1, 1927. The heavy black shaded portions show the main entry advancement made during the month of September, 1927. This marks the end of the development period, as the rooms were started and worked from this time on. The progress made during each subsequent three-month period is indicated by the various shadings and the advanced workings show the mine as of July 1, 1928.

Mechanical Loading In Entries And Rooms

Only one loading machine, working single shift, has been employed during this period, and when the work was confined to driving the main entries, two cuts, and at times three, were made in an entry during a shift. After the rooms were started, and since that time, it has been the practice to take but one cut per day in a working place, loading on the day shift only. The track extensions and slate handling is done at night as will be described later in this report.

One of the features of this operation which merits special consideration is the rapid rate at which the development and workings have progressed. It will be noted that within the first month of operation, as shown on the map, the main entries had advanced 300 ft. and had reached to the point where 6 rooms were ready to be worked. Before the end of the next three months there were 16 working places developed—consisting of 3 entries and 13 rooms—and the main entries were driven in 700 ft. from the starting point. This provided a sufficient territory to produce the present maximum output of 500 tons per day although this daily rate of production was not averaged during that period as the operating schedule and working crew had not then been organized to their present state of efficiency.

At the present time, the mine has 12 entries and 42 rooms under development, a total of 54 working places. At an adjacent hand mine, the management figures that an average of 10 tons per loader represents the expected production, assuming one man in each working place. On that basis the development shown in this mechanical mine is about what would be required to produce an output of 500 tons per day with hand loading. The usual rate of entry advancement in the hand loaded mine over long periods is reported as being from 3 to 4 ft. per day or about 75 ft. per month. At that rate the mine development shown on the map would have re-

quired about twenty months by hand work. A comparison, therefore, of the operating records made by the two mining methods indicates that with mechanical loading this mine was on a production basis in one-fourth of the time or 16 months before the same capacity would have been developed by hand loading.

During a recent four months operating period, the loading machine averaged a clean-up of fourteen working places per day. From the map it will be seen that more places have now been developed than are required for a single machine operation, and it will be noted further that the first block of rooms turned to the right off the main entries have not worked during the last three months. The reason for extending the development in this manner has been to provide sufficient territory for two loading machines and delivery of this additional unit is expected in the immediate future. On the basis of the present daily production, the workings, therefore, are not concentrated in a much smaller area than would be required for the same output by hand mining but when it is considered that this mine is now developed for an output twice as great as that now being produced—and from present records this expected output will be approximately one thousand tons per day—it will be seen that there is a very marked concentration over hand mining.

OPERATING REPORT

Physical Conditions

The seam has an average of 6½ ft. of coal with several small partings from ½ to 1½ in. Above the coal there is a draw slate from 1 to 8 in. thick; at times this will stay up until the cut is loaded out, but more usually it comes down with the coal. Above the draw slate the top generally stands well where the cover is heavy, but near the outcrop and under streams the roof is apt to be bad. The bottom is a hard slate. The seam is generally level and the cover varies from outcrop to 400 ft. Open lights are used. The coal at the working faces is sprinkled before loading.

Mining System

The mine is a drift operation and is worked advancing by the room and pillar system with mechanical loading in the rooms and headings. Three parallel entries are turned off a tunnel about 500 ft. inside the drift mouth; the middle entry is used as a main haulway and rooms are worked advancing off the right hand heading. These are 20 ft. wide on 40-ft. centers and are projected to be driven 500 ft. long. No pillars are at present being recovered but it is the intention to mine these retreating after the development has reached the property limits. Additional panels are being developed by two sets of face entries which are driven to the right and left off the main headings.

Cutting, Shearing, Blasting

All coal is machine undercut to a depth of 8½ ft. and center sheared. This is done by a combination cutting and shearing machine which works from the mine tracks. Two machines are used—each operated by a crew of two men—who also do the drilling with an electric hand drill. Two shots are used in an entry and four in a room; these are fired with black pellet powder and electric squibs. The coal is well broken down so that little digging is required by the loading machine. This work is all done on the day shift and from 7 to 8 places are prepared during a shift by each crew. On account of the number of working places under development there is no interference between the cutting and loading operations.

Mechanical Loading

The loader is mounted on wheel trucks and travels from place to place and loads from the mine tracks, discharging directly into mine cars of 3¾ ton capacity which are placed one at a time by gathering locomotives. The machine loads on the day shift only and is operated by a crew of two men—one at the controls and the other at the discharge conveyor. An average of 15 working places is loaded up during each shift. Two mechanics are employed—one on the day shift and one at night—for machine maintenance repair and inspection.

Hauling

Two gathering locomotives of the storage battery type serve each machine shifting single loads to adjacent rooms and delivering short trips to and from the main line gathering side track. Each locomotive is operated by one man. One main line trolley locomotive with one motorman hauls to the outside and through the tipple. The mine cars are 3¾ ton capacity, steel drop bottom type and are dumped in a solid trip without uncoupling.

Track

The track is on 42-in. gauge; a single track with 30-lb. rail is laid in the room and 40-lb. rail is used on the entries. A crew of five track men, three on the night shift and two on the day shift are usually employed to extend the rail and lay the switches.

Timbering

The timbering varies according to conditions and usually little is required in the entry except when occasional bad top areas are encountered. Two rows of posts are carried in the rooms with either two or four posts set after each cut. A crew of four timbermen is employed, all working on the night shift.

Slate

The draw slate varies from one to eight inches and either comes down when the coal is shot, or else is taken down after the cut is loaded out. The slate is gobbed in the rooms and loaded into mine cars in the entries. If the fall occurs with the shot some of the slate can be removed from the top of the fall before the loading machine starts and the remainder is picked out as far as possible by the machine crew during the loading. A crew of six slate men is usually required; these work on the night shift and one night motorman hauls the slate to the outside.

Summary of Operating Crew

Day Shift:

*2	Foremen
4	Cutters and Shearers
2	Loading Operators
2	Gathering Motormen
*1	Main Line Motorman
*1	Mechanic
3	Trackmen
15	Total Inside Day Crew

Night Shift:

*1	Foreman
*1	Motorman
*1	Mechanic
2	Trackmen
6	Slate Men
5	Timbermen
15	Total Inside Night Crew.

* Note—When the second machine is put in operation, it is estimated by the management that these men now employed will be sufficient for both units. It is further estimated that only one additional cutting and shearing machine, with a crew of two men, will be required. This will mean that 22 additional men, or a total operating crew of 52 men, will be employed underground for the two loading machine units.

Production Records

FOUR MONTHS OPERATING AVERAGE DURING 1928

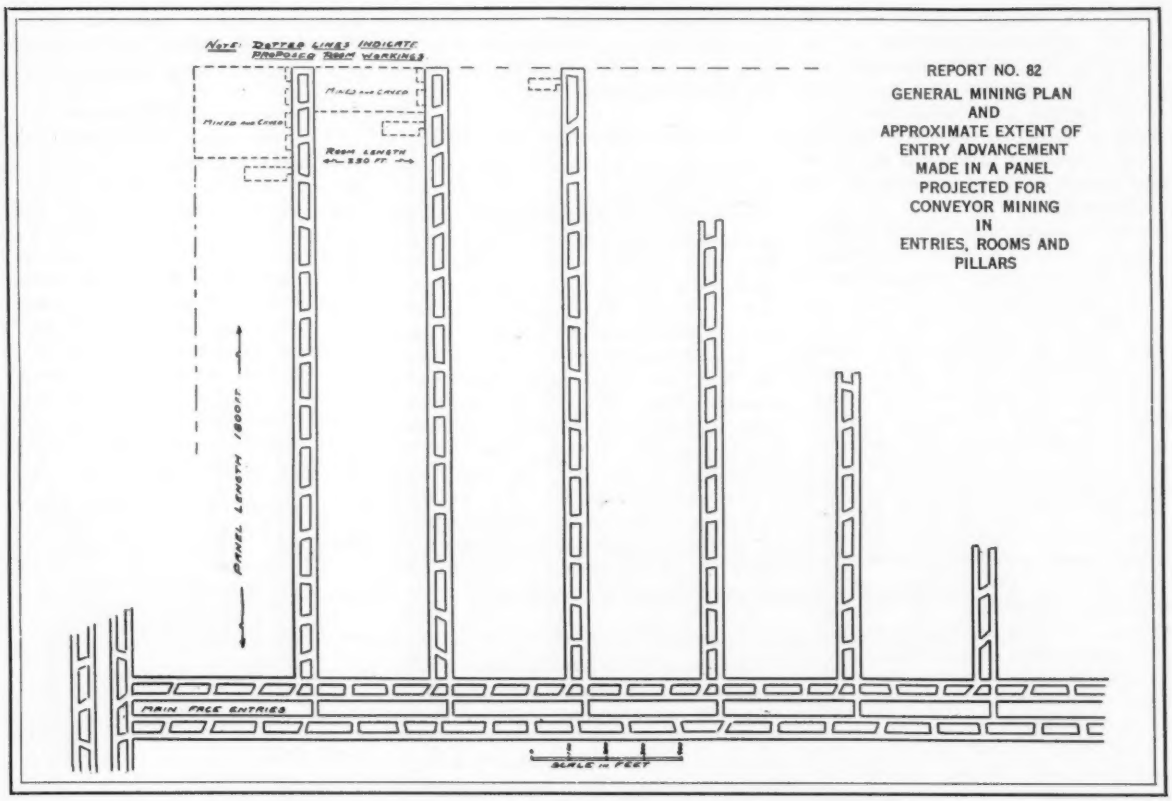
Average tons produced during month	10,815
Average number of days worked during month	23¼
Average daily tonnage	462
Number of working places loaded per day	14
Total linear foot entries and rooms driven per month	2,118
Average total advancement each day	92

Equipment

The present operation uses one loading machine, two combination cutting and shearing machines, two storage battery gathering locomotives, one main line haulage locomotive, two electric hand drills.

Preparation

The draw slate is removed as far as possible inside the mine, but no attempt is made to pick out the smaller particles which occur in the coal. Hand picking tables are used at the tipple and the management reports that about fifty per cent more picking labor is required than with hand loading.



MECHANIZATION REPORT NO. 82

By G. B. SOUTHWARD

Conveyor Mining In Entries, Rooms And Pillars

THE operation described in report No. 82 is in a mine where a seam about 4 ft. high is worked with hand loading on conveyors—developing entries, driving rooms, and recovering pillars. The first conveyor installation was made about two and one-half years ago, and since the first experimental unit was installed 12 additional units have been added and are now in operation, five working in rooms and eight on entry development. The first operation was experimental, and was for the purpose of determining the comparative efficiency between hand loading on conveyors and hand loading into mine cars. It was also for the purpose of determining how well a conveyor operation could be adapted to room and pillar mining and what modifications from standard room and pillar practice would be required. Some thought was given toward long face workings, but it was the opinion of the officials of this company that the organization of a conveyor operation had a better chance to prove successful if this were not complicated by adding the factor of an unknown roof action in an unfamiliar mining system.

The first use of conveyor mining by this company was in driving rooms on an entry which had been developed by hand loading and in order to have a production which would justify the expenditure for the equipment it was decided that it would be necessary to depart from hand mining schedules and practices and to do the cutting and loading continuously during the working shift and complete as many cycles as possible in a working place. Several months of experimentation proved this method to be practicable, and by the end of the first year a daily loading of from two to three cleanups per shift in a room was being made as a fairly regular performance.

The rooms are 35 ft. wide on 60-ft. centers and are driven 250 ft. long; the pillar between the rooms is pulled back immediately as far as a small stump, which is left to protect the haulway. It is reported by the management that a usual record now is to drive a room to its full length of 250 ft. and pull back the pillar to the heading stump in one month's time working on a single shift. This rapid rate of advancement has had a favorable effect on the roof, and it has been found possible to increase the width of the rooms from 24 ft., as used in hand mining, to 35 ft. as used with conveyor mining. In mine car loading the usual mining rate reported in the rooms is for two men to clean up one cut every day in a 24-ft. room. A comparison, based on these rates, indicates that a room operated with conveyors will produce during each working shift a tonnage equal to that which would ordinarily be mined from four rooms with hand loading into mine cars.

In driving the rooms a short face conveyor is laid parallel to the face, discharging onto a haulage conveyor which extends down the length of the room and loads into the mine cars on the entry. This eliminates all track work in the rooms and provides for loading the mine cars in a solid trip without single car gathering or placing. With this system, however, only one room is worked at a time along one entry, since it is believed that an attempt to work several rooms in close proximity to each other—as is done in hand mining—would cause interference along the haulway in placing the mine car trips for loading.

After the room work had been more or less standardized on a practicable operating basis, conveyors were used in driving entries to develop a panel that would be mined entirely with conveyor

loading. The map which is submitted with this report shows the general plan projected for the panel, and while this sketch is not an exact duplicate of the mine map it shows approximately the amount and the general extent of the entry work which has been completed so far with conveyor mining. The rooms are now ready to start; these will be mined retreating, beginning at the top of the first entry and extending across the panel on a stepped line, whose general angle will be about 20 degrees to the main entries.

In making this development several conveyor units have been employed, working double shift for the most part, and the management reports that a rate of three cuts per shift is now considered their standard rate of advancement. With hand mining the expected rate would have been two cuts in three shifts, or two-thirds of a cut per shift. A comparison on the basis of these records indicates that in this particular operation the development has proceeded four times as fast as it would have been made with mine car loading, and the rapid rate of entry driving has enabled the management to project this panel for mining by the retreating system.

The territory developed with conveyor mining, as shown on the map, is in a section of an old mine which has been assigned to the conveyor work, and this panel is entirely separate from the hand loading in the other sections of the mine as far as the main line haulage. From the main haulage to the tipple the coal from the conveyor and the hand workings is all handled as a joint operation. About one-sixth of the total output of the mine is now being loaded on conveyors.

OPERATING REPORT ON ENTRY DRIVING

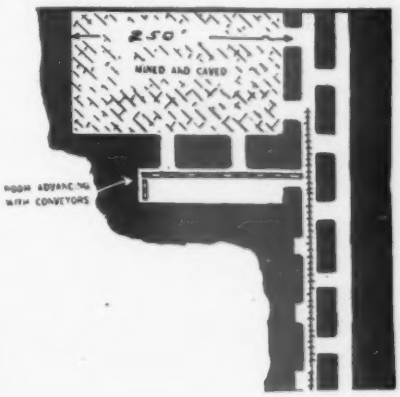
Physical Conditions

The seam will average about 4 ft. in height, which includes a 6-in. bone parting at the top. The coal is of medium soft structure. The top is stratified slate, which stands in the entries without much timber. Hard slate bottom. The seam is slightly rolling and grades of from 5 to 10 percent are frequently encountered. Cover 300 ft. Closed lights are used and the entries are rock dusted.

Mining System

The panel is being developed for mining on the retreating room and pillar system. The entries are 12 ft. wide on 50-ft. centers; these are turned at 250-ft. intervals from a set of four face entries and are driven 1,800 ft. to the panel barrier. From 2 to 3 ft. of top rock is taken down along the entries.

In driving the entries a pair of headings is taken as an operating unit for a conveyor installation and only one entry is advanced at a time. The conveyor is laid from the face back to a point along the entry, where mine cars are placed for loading, and after each cut is cleaned up the conveyor is extended by adding a section onto the front and at the face. The discharge point remains stationary until the conveyor has been extended to a length of 200 ft., when it is moved ahead or into the adjoining entry. A cutting machine is maintained at the working face, and all the operations from the cutting to the loading are performed continuously during the working shift by a regular crew of three men. The method of driving rooms and recovering pillars



Room advancement as shown in Report No. 111

has already been shown and described in our mechanization report No. 111, and will not be further described here.

Cutting, Drilling and Shooting

The coal is machine undercut to a depth of 6 ft., drilled with an electric hand drill and shot with permissible explosives and electric caps. This work is performed by the regular loading crew immediately after a cut is cleaned up, two men operating the cutting machine while the third man is usually engaged in mechanical work preparatory to extending the conveyor. Two shots are fired in each entry and a ventilating blower with tubing is operated for a few minutes after the shots to blow out the smoke.

Conveyor Loading

The conveyor is laid in the center of the entry, so that the coal from the corners is within easy shoveling distance. After the coal has been shot down, two men shovel at the face while the third man is at the discharge end of the conveyor on the entry, trimming the cars.

Slate

From 2 to 3 ft. of top is brushed along the haulage. At times it is the practice to shoot down the roof immediately after the cut has been loaded out, and in such cases this work is done by the regular loading crew, who shovel the slate onto the conveyor, which loads it into the mine cars. Where more than 2 ft. of slate is taken, it is the usual practice to advance the entries for a distance of 200 ft. before brushing, and the top rock is then shot down and loaded out into mine cars by a separate crew while the conveyor is driving the adjoining entry. A mechanical loader has been used very successfully for this rock work.

Haulage

A gathering locomotive places a trip of eight cars at one time at the conveyor discharge point, and these are moved while loading by an electric rope hoist. The mine cars are of steel construction, with a 2-ton capacity. The track on the entry is laid with 40-lb. rail on a 42-in. gauge.

Operating Crew

A regular operating crew of three men is used in the entry driving, and these do all the work—cutting, drilling, shooting and loading—from the face to the mine car. The gathering locomotive crew of two men can serve four conveyor operations. The work is usually carried on double shift, each shift being eight hours.

Preparation

The bone parting is removed at the working face and the tipple is equipped with picking tables further to insure clean preparation.

Equipment

A unit operation has one conveyor, with a maximum length of 200 ft. This is a sectional type, steel trough and chain, and is electric driven. There is also, as part of the unit equipment, one cutting machine, one electric hand drill, one electric rope hoist for moving mine cars, one shot-firing battery and one blower with tubing to remove smoke after the shots are fired.

Production Records

In the entry work an advance of 15 ft., which produces about 36 tons, is reported the average performance during a shift. By working double shift, a pair of headings advance at this same rate. In the room work an advance of 15 ft., with a production of 80 tons, is reported as the usual average.

METALS

GUY N. BJORGE
Editor

Practical Operating Problems of the Metal Mining Industry

The CRUSHING PLANTS *of* NEW CORNELIA COPPER COMPANY

By W. L. DUMOULIN †

General view of carbonate and sulphide crushing plants, New Cornelia Copper Co.

TWO classes of ore—oxides and sulphides—are mined by the New Cornelia Copper Co., each low grade and requiring a different process of treatment. The oxides occur mostly as the carbonates — malachite and azurite. Occasionally cuprite is found and the silicate—chrysocolla. The characteristic sulphide is in the form of chalcopyrite mixed with bornite; although chalcocite does occur with these minerals in the southern portion of the pit for a limited depth.

The sulphides constitute the major part of the ore body; the carbonates originally forming the capping or overburden of the sulphides. It was necessary to remove the overburden of carbonates before the sulphides could be mined, and the success of this mining enterprise was dependent upon this being done on a commercial basis. As a consequence, the leaching process for the treatment of carbonates was first installed. The leaching plant started treating ore about May, 1917, and seven years later, in April, 1924, a concentrating plant using the flotation process for the treatment of sulphide ore began operations. Since that time, both plants have been operating. A dilute sulphuric acid solution is used in the leaching process for dissolving the copper in the ore, and from this solution the copper is obtained directly in the form of cathodes by electrolytic deposition. On the other hand, the concentrates from the concentrating plant are shipped to the smelter of the Calumet & Arizona Mining Co., at Douglas, Ariz., and from there the blister copper is shipped to the refinery of the Raritan Copper Works at Perth Amboy, N. J.

Treatment Of Low-Grade Oxide And Sulphide Ores—Primary And Secondary Crushers For Each—Loss In Crusher Metal Per Pound Of Ore Determined—Water Development And Pumping Equipment Detailed

There is a separate crushing plant for each process.

Considerable experimental work was done in the early days, and among the various things to be determined was the best type of crushing equipment for the leaching plant. It was desired to have a product with a minimum of fines and also the minimum amount of oversize. Experiments had determined that the solutions would penetrate fairly well a kernel of the ore less than ¼-in. in thickness. While the screen sizing tests indicate sizes in excess of ¼-in., nevertheless a large percentage of this oversize material is less than ¼-in. in thickness. The Symons vertical (pillar) type of disc crusher was found to give a very satisfactory product for leaching purposes without screening, and this was, therefore, the type of crushing equipment adopted for the fine crushing unit of the carbonate crushing plant. The correctness of the decision to use the vertical (pillar) type of Symons disc crusher may be gauged somewhat by the records obtained in the leaching operations. While there are many factors affecting the extractions, the size of the finished product for the leaching tanks is one of them. For the last three months of 1927 the average extraction of total copper was 86.43 per cent. A re-

* Presented to the Ajo Meeting, Arizona Chapter, The American Mining Congress, May 1, 1928.

† General Superintendent, New Cornelia Copper Company.

Receiving bin, manganese steel pan conveyor, coarse crushing plant, sulphide crushing plant

Symons horizontal disc crusher floor in roll plant, sulphide crushing plant

covery such as this would indicate that, as size of material for leaching tanks is only one of the factors affecting our extractions, it is doubtful whether a finished product for the leaching plant with less oversize (than the product of the Symons vertical disc crushers contains), would have improved our results; at least, so as to be commercially noticeable.

There was a difference of opinion among those interested in the design of the leaching plant, as to the relative merits of rolls compared to other types of crushing equipment and, as a consequence, when the concentrating plant was designed in 1922 and 1923, this matter was given consideration. It was felt that rolls might make an excessive amount of fines which might interfere with the satisfactory percolation of the solutions in the leaching tanks or vats. A feed for the rod mills of the concentrator containing a large amount of fines would not be objectionable; if anything, desirable; nor would the question of oversize enter into the problem. A roll product without screening would be suitable for rod mill feed. After matters had been thoroughly weighed, rolls were installed in the fine crushing unit of the sulphide crushing plant.

Both the carbonate and the sulphide ores come from a steam shovel open pit mine and are considered very hard. Compared to the ore from an underground mining operation, a much larger percentage has to be crushed and a great deal more work is done consequently by the crushing equipment. The per-ton costs are naturally greater than would be the case when crushing a softer ore from an underground mine. It is essential to have crushing equipment which will have large capacity, be rugged in construction and designed to withstand the severe service that long hours of continued operation and the crushing of large daily tonnages of hard ore demand.

As already stated, the ore is mined by steam shovels. It is loaded into side-dump ore cars of a capacity of 20 yards or about 40 tons each. There are six cars to a train, and the average haul is about a mile and a half.

Ore mined by steam shovel contains many boulders, some as large as 4'x4'x10'. A boulder of these dimensions will pass through a steam-shovel dipper, which establishes this maximum size. The primary crusher in each plant must, therefore, have an opening large enough to take care of this maximum size.

The crushing plant for the carbonate ores has been in operation 11 years; the other, for crushing the sulphide ores, four years.

Carbonate Ore Crushing Plants

The carbonate ore crushing plant consists of a primary crushing plant and a secondary or fine crushing plant; each with two stages of crushing. The primary plant reduces the ore to less than 3 in.; the secondary, to as nearly a ¼-in. product as is practical without screening. Good extractions are obtained from our ore when crushed to this size. From the primary crushing plant the ore is carried by two 36-in. belt conveyors, operating in parallel, to a 10,000-ton steel storage bin with a flat reinforced concrete bottom. Trippers on each of the two belts discharge the ore either into the bin proper or into the small high-grade bin for such high grade or direct smelting ore as may be found. (See plan of carbonate crushing plant.) From the bottom of this bin the ore discharges through hoppers and small movable pan feeders onto four 20-in. belt conveyors, which deliver it to the four original units of crushers in the fine crushing plant. A 20-in. cross conveyor belt under the bin takes the ore from one side of the bin to a fifth unit, which was added about two years after the installation of the storage bin and the four original units. A system of 28-in. belt conveyors carries the ore from the fine crushing plant to the leaching tanks. On its way to the tanks it passes through an automatic sampling plant, where a sample is obtained by buckets cutting the stream of ore falling from one conveyor belt to another at regular intervals. This sample amounts to 1 percent by weight of the ore charged to the leaching tanks.

There is no receiving bin between the mine and the primary crushing plant. Jams form in the bowl of the coarse crusher in the primary crushing plant, and these are freed by means of a large steel hook operated from a 40-ton electric traveling crane, which is also used to handle the heavy parts of the 48-in. gyratory crusher during repairs.

Primary Crushing Plant

This plant consists of a large Gates style K gyratory crusher with a 48-in. opening followed by four No. 8 Gates style K gyratory crushers. All of the carbonate ore from the mine is dumped directly from the mine ore cars into the bowl of this 48-in. gyratory. The 48-in. gyratory crusher breaks the ore to about 6-in. size and discharges directly into the bowls of the four No. 8 gyratories after passing over stationary bar grizzlies with 3-in. spaces. The No. 8 gyratories take this 6-in. to 8-in. product from the 48-in. gyratory and reduce it to less than 3 in. The 48-in. gyratory discharges from two sides. Two of the No. 8 gyratories are on each side of this crusher. These discharge their product on to one of the 36-in. belt conveyors carrying it to the 10,000-ton storage bin. All crushers in the primary plant are belt-driven by alternating-current induction motors. Each No. 8 is driven by a 2,200-volt, 100-hp. squirrel-cage type motor, while the 48-in. crusher is driven by a 2,200 volt, 200-hp. slip-ring type motor.

Secondary Crushing Plant

The secondary plant consisted originally of four units of Symons 48-in. vertical shaft (pillar) disc crushers, each unit containing three crushers, one coarse Symons and two fine Symons. The coarse and fine Symons are identical with the exception of the upper disc, which, in the coarse crusher, has a grinding surface 4 in. wide, and in the fine crushers, 6 in. wide. Each crusher in this plant is driven by a special direct-connected 2,200-volt, 75-hp. alternating-current induction motor, having a speed of 400 r.p.m. As the ore is harder than was anticipated, it was demonstrated that to crush the 5,000 tons in the desired time the crushers would be crowded too much for economical maintenance, so a fifth unit of three 48-in. Symons vertical shaft disc crushers was installed.

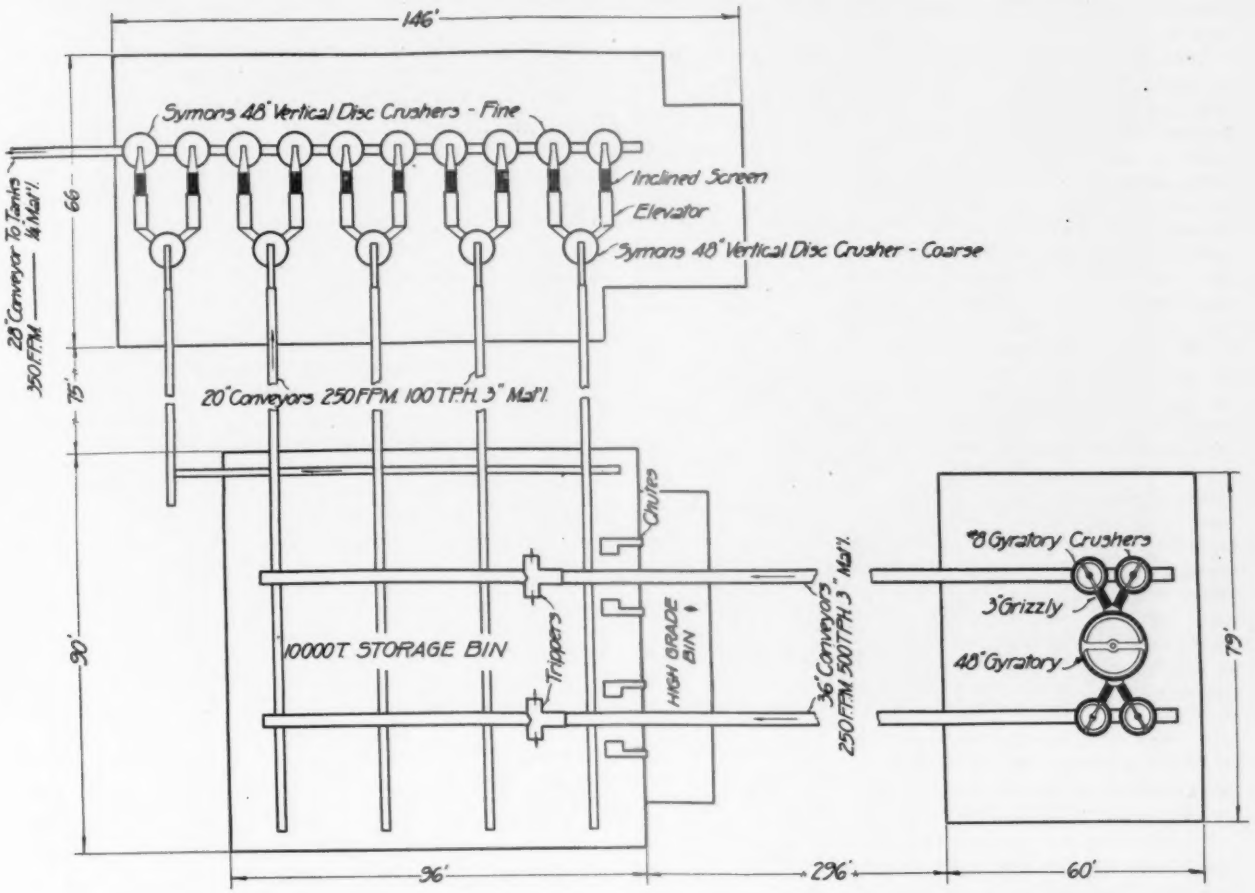
The ore from the primary crushing plant is conveyed to the storage bin of 10,000 tons capacity, from which it is fed to the coarse Symons of each unit at a uniform rate. and crushed to approximately ¾-in. The discharge from these coarse Symons crushers is divided, one-half passing to each of the two fine Symons crushers in each unit, where it is crushed to approximately ¼-in. Screens ahead of the fine Symons crushers by-pass a large percentage of the undersize. In each unit, between the coarse crusher and the two fine crushers, there are two elevators which feed the product from the coarse crusher to the two fine crushers. These elevators were necessary on account of the topography of the country, so as to gain the necessary elevation for the ore to flow to the fine Symons crushers. The capacity of a unit depends somewhat on the character of the ore, and varies from 90 to 100 tons per hour. The coarse Symons have a capacity of 100 tons per hour, crushing to ¾-in. with small cost of repairs; but the fine Symons have each a capacity of only 50 tons per hour crushing to ¼-in. with rather heavy repair costs. This type of crusher has proved satisfactory for the service required of it and gives the most uniform product that has the minimum amount of oversize and fines without screening. A great deal of trouble had been experienced with tramp iron in the Symons disc crushers, but this trouble has been eliminated largely by the suspension of powerful magnets over the conveyors leading from the primary crushing plant. These magnets were installed in addition to the magnetic head pulleys already in service. All conveyors in both the primary and secondary crushing plants are equipped with magnetic head pulleys.

No. 8 gyratory crushers at intermediate storage bin, sulphide crushing plant

In its preparation for the grinding section in the concentrator, the sulphide ore passes through three crushing plants; a primary crushing plant (see plan of sulphide crushing plants), an intermediate crushing plant and a secondary, roll or fine crushing plant. The ore from the mine is dumped into a concrete receiving bin of about 500 tons net capacity, located ahead of the primary crushing plant. A manganese steel pan conveyor 8 ft. wide and 72 ft. long, traveling at a rate of about 9 ft. to 10 ft. per minute, carries the ore from this receiving bin and delivers it to the primary crusher at a uniform rate. (See picture No. 2.) The manganese steel conveyor extends under the bin and forms its bottom. This pan conveyor virtually amounts to being a feeder of very large dimensions and handling extremely coarse material. The primary crushing plant reduces this ore to about a 6-in. size; the intermediate crushing plant to between 2 inches and 3 inches; and the roll plant to a size which runs about 11½ percent on ½-in., this being the size of the feed for the rod mills in the grinding section in the concentrator. The 6-in. or 8-in. product from the primary crushing plant is delivered by two belt conveyors in tandem to the intermediate 5,000-ton steel storage bin. This bin has a reinforced concrete bottom and is located between the primary and secondary crushing plants. The two conveying belts are, respectively, 48 in. and 42 in. in width. The ore is discharged from the second belt, which is located along the top of the bin, by means of a tripper into this bin. From the bottom of this intermediate storage bin the ore is drawn through steel apron feeders onto short 36-in. belt conveyors and is delivered by these conveying belts to the four intermediate crushers. Four 24-in. belt conveyors deliver the 2½-in. product from the intermediate crushing plant to Symons 48-in. horizontal disc crushers in the roll plant. From the roll plant, two belt conveyors in tandem, one 42 in. wide, the other 48-in. wide, carry the roll product to a 10,000-ton fine ore bin at the head of the concentrator. Along the top of this 10,000-ton bin a third conveyor belt, 42 in. wide, distributes the ore into the bin through a tripper car. All of the belt conveyors, with the exception of those along the top of the bins, run at an incline and thus elevate the ore as well as carry it from one plant to another, a condition brought about by the topography of the country.

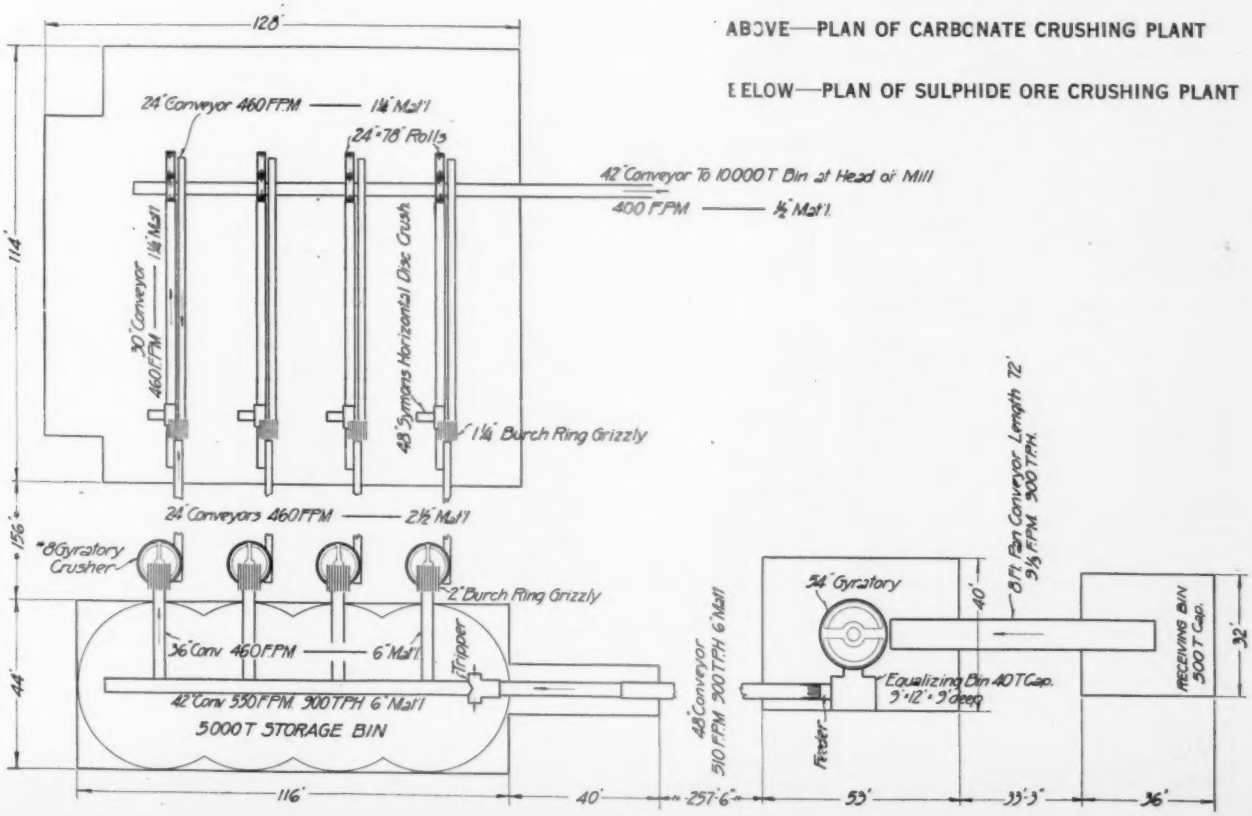
The equipment of the primary crushing plant consists of one McCully 54-in. gyratory crusher. A crusher of this size was desirable to economically crush the ore from an open-pit copper mine containing many large-sized boulders. In case the manganese steel pan conveyor which feeds this crusher can not be operated, the ore can be dumped from the mine ore cars directly into the bowl of this big gyratory. As in the case of the large gyratory in the primary carbonate crushing plant, any jams of ore that may form are freed by means of a large hook operated from a 40-ton electric traveling crane, which is also used in lifting the heavy parts of the crusher during repairs. The shaft, head and manganese steel mantle of this crusher weigh over forty tons. These must be lifted together whenever work is required on them. Other parts are correspondingly heavy and massive. This crusher has a discharge on only one side, and the 6-in. to 8-in. product discharges into an equalizing bin before passing onto the 48-in. conveying belt. Leaving this equalizing bin, the product passes on to a feeder belt and discharges over stationary fingers, permitting the fine material to fall onto the conveying belt to form a protective coating on its surface before the 6-in. or 8-in. size reaches it.

There are four Gates No. 8 style K gyratory crushers at the intermediate crushing plant, which reduce the 6-in. or 8-in. product from the 54-in. crusher to 2½-in. size. These intermediate crushers are located right at and below the



ABOVE—PLAN OF CARBONATE CRUSHING PLANT

BELOW—PLAN OF SULPHIDE ORE CRUSHING PLANT



intermediate storage bin. (See illustration on page 621.)

The roll plant contains four units, each of which receives the 2½-in. product from one of the four gyratories in the intermediate crushing plant. The equipment of each unit consists of a 48-in. horizontal Symons disc crusher, followed by a set of Traylor 78-in. x 24-in. rolls. Revolving Burch ring grizzlies are located ahead of the No. 8 gyratories at the intermediate crushing plant and ahead of the Symons disc crushers at the roll plant. The rings in the grizzlies at the intermediate plant are spaced 2 in. apart and those at the roll plant 1¼ in. apart. The horizontal Symons disc crushers are set so as to give a 1¼-in. product, while the rolls are set from 3/8-in. to 7/16-in. apart. These rolls are operated without screens. Splitters are used to cut the middle part of the 24-in. ribbon of the roll discharge, thus bypassing the oversize next to the cheek plates, which is returned to the roll circuit. Magnetic head pulleys are installed on all of the important conveyors as well as powerful stationary magnets suspended over the 48-in. conveyors running from the primary plant to the intermediate bin and over the 24-in. belt conveyors delivering the ore to the Symons crushers in the roll plant, to protect the equipment from tramp iron.

The following are the average screen sizing tests for the year 1927 for the Leaching Plant heads and for the rod mill feed for the concentrator:

LEACHING PLANT HEADS—VERTICAL SYMONS PRODUCT

	Average
No. of charges	213
On .525 mesh	1.0
On .371 mesh	7.6
On 3 mesh	19.0
On 4 mesh	16.8
On 6 mesh	14.1
On 8 mesh	8.4
On 10 mesh	6.5
On 14 mesh	4.7
On 20 mesh	3.7
Through 20 mesh	18.2

ROD MILL FEED FOR CONCENTRATOR—ROLL PRODUCT

	Average
On .742 mesh	2.3
On .525 mesh	9.1
On .371 mesh	15.4
On 3 mesh	17.0
On 4 mesh	10.2
On 6 mesh	8.5
On 8 mesh	5.9
On 10 mesh	5.2
On 14 mesh	4.1
On 20 mesh	3.4
Through 20 mesh	18.9

For the year 1927 the accumulated amount on .525 mesh for roll product is 11.5 per cent; for vertical Symons product, 1 percent. The accumulated total on .371 mesh for vertical Symons product for the year was 8.6 percent, as compared to the roll plant product of 26.8 percent.

The power consumption in kw. hours per ton of ore is as follows:

CARBONATE CRUSHING PLANT

	Kw. hrs. per ton
Coarse crushers, including 48-in. and four No. 8's	.220
Fine crushers, including coarse vertical Symons and fine vertical Symons	1.241
Total both crushing plants	1.461

SULPHIDE CRUSHING PLANT

	Kw. hrs. per ton
Coarse and intermediate crushers, including 54-in. and No. 8 gyratories, at the intermediate plant	.242
Roll plant, including horizontal Symons disc crushers and rolls	1.052
Total coarse, intermediate and fine crushing plant	1.294

The Symons vertical crushers are delivering a product with less oversize than the rolls, and consequently a larger power consumption per ton is to be expected.

From April, 1918, to May, 1924, the leaching plant was operated on a basis of about 5,000 tons per day, during which time the primary plant of the carbonate crushing plant operated two shifts; also the fine crushing plant. Since May, 1924, after the concentrator opertions began, the leaching plant has been operated at approximately 3,000 tons per day. This tonnage is crushed by the fine crushing plant in one shift. At the present time the carbonate ore is found principally near the edge of the pit, and mixed in with it are areas of barren or waste material, which have to be moved in order to mine the ore. In order to enable this ore to be mined without interruption when it is reached, it was necessary to go to a three-shift basis of operation with the primary crushing plant. The total tonnage crushed by the carbonate crushing plant for the year 1927 was 1,093,250.

The primary, intermediate and roll plants of the sulphide crushing plants each operate two shifts. For the year 1927 the sulphide crushing plant crushed 2,278,005 tons, or an average of 6,300 tons per day. There have been days in which 7,000 tons were crushed by these plants, and they handled this tonnage easily. While the primary crushing plant could handle a larger tonnage, up to about 900 tons per hour, easily, the time of operation for the intermediate crushing plant and roll plant would have to be increased to handle tonnages in excess of 8,000 per day. The No. 8 gyratories and the horizontal Symons disc crushers limit the capacity of these units. The capacity varies with the hardness of the ore. The average for the months of November and December, 1927, and January, 1928, was 130 tons per hour. The rolls have a capacity far in excess of this.

There is a different type of crushing equipment in the fine crushing plants for the carbonate and sulphide ores. The crushing equipment in both of these plants handles ore in large tonnages from the same mine, mined by the same methods and differing principally only in the degree of hardness—the sulphide being somewhat harder and more abrasive—and thereby an opportunity is afforded to observe to some extent the merits of the different types of crushing equipment installed. Ahead of these fine crushing plants the same type of crushing equipment is employed in each case for crushing the carbonate and sulphide ores, but with a difference in the detail of design and in the arrangement of same.

In the carbonate crushing plant the ore is dumped directly into the bowl of the 48-in. gyratory at the primary plant, with the result that all crushers in this plant are operated under a condition of what may be termed a "choke" feed. There was a delay to the mine in connection with this plant under full operations, because of the fact that the trains can not be unloaded faster than the crusher will break the ore. As a consequence, it requires about 20 minutes to unload a train of six cars of ore, and around 30 minutes to accomplish the crushing of this ore. The bowl will hold about a car and a half of ore, so consequently the train is released some 10 minutes earlier. As trains do not follow each other closely at the present time, there are times during the shift when these crushers do not operate; that is, the operation is intermittent. The situation is different in connection with the secondary carbonate crushing plant, because the ore is drawn from the bottom of the bin through pan feeders at a uniform rate, so the crushers in this plant have a uniform feed, giving continuous operation.

The sulphide crushing plant was designed so as to effect a reduction in the delays to trains from the mine at the primary crushing plant. To accomplish this the receiving bin of 500 tons net capacity, with an 8-ft. pan feeder or conveyor, was installed at the 54-in. crusher. This bin has a capacity of a little over two train loads. About five minutes are required to unload a train, as compared to 20 minutes at the carbonate crushing plant. The ore is fed then at a uniform rate by the 8-ft. steel pan conveyor into the 54-in. crusher, permitting of a more steady operation of this crusher. In the sulphide crushing plants, wherever it seemed to advantage, more extensive provision has been made to by-pass undersize at the crushing equipment by the installation of suitable screening devices ahead of it. Bins have been placed at all critical points of such capacity that they will even out peaks so far as practical, so that more generally a uniform and continuous flow of feed can be maintained to the various crushers. It was thought that refinements in

Rolls in roll plant, sulphide crushing plant

Symons vertical disc crushing plant, carbonate crushing plant

design—such as more extensively by-passing the undersize and more generally providing for continuous uniform rate of feeding of ore—would also result in the crushers doing the work more economically, but our experience, as reflected in the per ton costs, indicates that this was not realized. Any saving that might have been effected because of a reduction in maintenance in one direction was offset by increases in another.

The finished product for the rod mills in the concentrator is made by the rolls in the fine crushing unit of the sulphide crushing plant. The rolls in this fine crushing unit were the first rolls of this size to be built and operated anywhere, and consequently are known as the Ajo-type rolls. They were manufactured by the Traylor Engineering & Manufacturing Co. and are regarded as the largest and most powerful rolls built at the present time, are of massive construction, have operated easily, and have a large capacity. The tires or shells are 9 in. thick when new. The bearings for the roll shaft are 3 ft. 10¾ in. by 21½ in. diameter for the pulley side and 3 ft. 6 in. by 21½ in. diameter for the thrust side, and are water cooled. The roll shafts are built of forged steel and are each 21½ in. in diameter, 15 ft. 3¾ in. over all in length. The four tension rods are 7½ in. in diameter and the spring pressure is 15 tons per inch width of face. The fly wheel pulleys have each a diameter of 10 ft. with a face of 21 in. in width. They are built of cast iron and have a solid web built-up hollow with steel plate. Both shafts are fitted with equal pulleys and are belt driven by separate motors. The rolls have high peripheral speeds, and because of the great spring pressure they are fairly rigid and adapted for the crushing of our hard ores and large tonnages. It is estimated that when set to ½ in. the capacity will be in excess of 500 tons per hour per roll. There are two slip ring type 2,200-volt alternating-current 250-h.p. motors for each set of rolls. From January, 1924, to October, 1924, the rolls ran at 110 r. p. m. In October, 1924, the speed was reduced to 102 r. p. m. As these rolls have excess capacity, it was thought that in reducing their speed there would be less wear on the shells and they would do better work. We have used both rolled or forged steel and cast steel shells or tires on the rolls. The steel consumption with rolled steel shells has been .1178 lb. per ton of ore crushed; for cast steel shells, .1155 lb. As the cast steel shells cost less per pound, it is apparent that there is an advantage in using them. We have used every care to prevent corrugation of the shells; the speed was reduced; they are taken up every night and shifted or fleeted; while as large a circulating load of oversize and fines as possible, without sacrificing the capacity of the unit, is returned to the roll feed; but the corrugation of the shells still exists. Averagely the roll shells will wear down to about 2 in. when they stretch to such an extent that they can not be held tight and have to be removed.

We believe that a finer roll product would increase the tonnage of the rod mills in the concentrator. Without hard ore, a ratio of reduction of 3 to 1 is about as good as can be expected with our rolls. To obtain a finer roll product, it would be necessary to set the rolls closer, which would require a finer feed to them. To accomplish this and to meet the capacity of the rolls, a different type of crushing equipment of ample tonnage will be required ahead of the rolls. Consideration is being given to this problem at the present time.

On account of the corrugating of shells on rolls, to obtain a satisfactorily classified finished fine product which will continue to run uniform as feed for the rod mills in the concentrator, a screening installation in closed circuit with the rolls is necessary. Experimenting will be required to determine whether the results justify such an installation in our case.

From the start of operations in May, 1917, to January 1, 1928, the vertical Symons disc crushers have crushed a total of 14,566,705 tons of ore. The maganese steel in discs worn and wasted per ton of ore crushed by the vertical Symons disc crushers averaged over a period of six years amounts to .035 pounds. During the first few years of operation, the rate of wear per ton of ore crushed was greater than this. More careful op-

eration and improvement in the quality of the manganese steel discs account for this reduction.

The horizontal Symons disc crushers in the roll plant show a—

	Lbs. per ton of ore
Manganese steel consumption of discs of..	.0090
Cast steel consumption of shells in the rolls.	.1155
Total steel consumption of crushing surfaces in the roll plant.....	.1245

The manganese steel worn and wasted by the concaves and mantles of the gyratory crushers is:

CARBONATE ORE CRUSHING PLANTS

	Lbs. per ton of ore
48-in. gyratory—concaves.....	.0016
48-in. gyratory—mantle.....	.0023
Total manganese steel consumption..	.0039
Four No. 8 gyratories—concaves.....	.0033
Four No. 8 gyratories—mantles.....	.0028
Total manganese steel consumption..	.0061
For carbonate ore crushing plant—total...	.0100

SULPHIDE ORE CRUSHING PLANTS

	Lbs. per ton of ore
54-in. gyratory—concaves.....	.005
54-in. gyratory—mantle.....	.0023
Total manganese steel consumption..	.0073
Four No. 8 gyratories—concaves.....	.0060
Four No. 8 gyratories—mantles.....	.0057
	.0117
For sulphide ore crushing plant—total....	.0190

The foregoing figures are based on data representing the averages of long periods of operations.

The roll plant has crushed a total of 8,580,318 tons from January 1, 1924, to January 1, 1928.

This summarizes our experience with various types of crushing equipment mentioned, under our conditions of operation.

DATA ON WATER DEVELOPMENT AT AJO, ARIZ., NEW CORNELIA COPPER COMPANY

Prospecting for water was done by drilling for water in three different locations.

Well No. 1, located 6¾ miles north of Ajo.

Well No. 2, about 4 miles north of Ajo.

Well No. 3, about 13 miles northwest of Ajo.

Wells Nos. 1 and 3 developed an adequate supply of good water.

Well No. 2 had an insufficient supply of water.

An extensive water supply was developed at well No. 1 and an underground pumping plant installed there, because it was the nearest source of water to Ajo.

Two steel pipe lines convey the water to Ajo, a 10-in. line and a 20-in. line.

The 10-in. line delivers water into a steel storage reservoir of 500,000 gallons capacity at Ajo, from which it is distributed by gravity for domestic use, fire protection, and general use about the plant.

The 20-in. line delivers water to a concrete reservoir of about 1,250,000 gallons' capacity above concentrator for concentrator use.

Two shafts have been sunk, connected underground with a drift about 14 ft. by 12 ft. inside of timbers.

Six pumping stations have been cut from this drift, each 19 ft. wide by 15 ft. by 47 ft. long inside of timbers.

The floor of these pump stations and drift is approximately 646.6 ft. from the surface and approximately 1½ ft. above the water level.

The shafts were sunk down into the water zone, forming sumps. Shaft No. 1 extends about 36 ft. into the water zone and Shaft No. 2, 47 ft. Each shaft is a two-compartment shaft, with a hoisting compartment 4 ft. 3½ in. by 4 ft. 9½ in., and the pipe compartment 5 ft. 9½ in. by 4 ft. 9½ in. Pipe compartment contains all power lines, pipe columns, water supply lines for fire protection purposes and a manway. All dimensions given are inside of timbers.

The shafts, pump stations and interconnecting drift are all fireproofed by a coating of plaster.

There are two overhead suction sumps underground—one 9.65 ft. wide by 4½ ft. deep by 38.8 ft. long; the other 14 ft. wide by 7½ ft. deep and 76 ft. long.

The sides, bottoms and roofs of both sumps are concreted. The sumps are interconnected by pipe lines having a combined capacity of 74,600 gallons of water.

Equipment

There are four pumps installed underground, leaving two pump stations for additional pumps, if future requirements demand them.

Two pumps are Prescott pot form type, 24 in. by 5½ in. horizontal, duplex center packed, four plunger pumps. Displacement of each, 987 gallons per minute at 100 r. p. m. There are 12 suction and 12 discharge valves, totaling 24 for each pump. Valves are 8½-in. diameter of double beat type with fiber facings. Water cylinders and valve chambers, cast semi-steel. Over-all dimensions of each pump, 32 ft. 5 in. long and 13 ft. 10½ in. wide, requiring a clearance of 12 ft. 3 in.

These pumps are driven by synchronous motors of 500 hp., each mounted directly on crank shafts between bearings, the rotor of motor functioning as flywheel.

The other two pumps are Worthington 7½ in. by 24 in. horizontal, duplex, center packed, four plunger pumps with forged steel water ends. Valves identical with above as to number and type. Each pump has a displacement of 1,325 gallons per minute at 72 r. p. m. Over-all dimension of each pump 35 ft. long and 15 ft. wide, requiring a clearance of 12 ft.

Each pump is driven by a 525-hp. synchronous motor. Installation of motors similar to described on Prescott pot form pumps.

Shaft No. 1 has two pipe columns—an 8-in. and a 10-in.

Shaft No. 2 has a 14-in. pipe column.

Capacity of 10-in. line about 900 gallons per minute; pressure 710 pounds at pump.

Difference in elevation between pump discharge and tank at Ajo, 1,176 ft.

Pressure when pumping 1,250 gallons through a 20-in. line about 525 pounds.

Static head when pumping through 20-in. line to concentrator reservoir, 1,152½ ft.

At Shaft No. 2 three deep-well type of centrifugal pumps are installed, delivering water to the overhead sumps underground.

Two of these pumps have a capacity of 2,600 gallons per minute; the other about 1,300 gallons per minute.

In Shaft No. 1 there are two sinker type centrifugal pumps, each of 1,000 gallons per minute capacity.

Leading from both shafts are a total of around 450 ft. of drifting in a lava formation.

These drifts in the water zone deliver the water to the sumps at the shafts. Water oozes in sides of drifts and through cracks and crevices of same.

Temperature of water 102 degrees Fahrenheit.

Power transmitted from Ajo to well over 44,000-volt transmission line, stepped up from 2,300 volts at power plant by outdoor type of substation and stepped down at well to 440 volts through outdoor type of substation.

For the year 1927 pumped an average of 2,200 gallons per minute, or 3,168,000 gallons per day.

BOOK REVIEW

YELLOW GOLD OF CRIPPLE CREEK—Romances of the Mines, Mining Men, and Mining Fortunes—*By Harry J. Newton.* One hundred and twenty-eight pages; over 100 illustrations, including historical photographs made at the time of the visits to the great Colorado gold camp of Theodore Roosevelt, William Jennings Bryan; also Lieut. R. E. Peary, of North Pole fame. Published by Nelson Publishing Company, 1848 Stout Street, Denver, Colo. Paper edition, $1; cloth bound, $1.50.

View of plaza, showing churches, school, business block and hospital, New Cornelia Copper Company

The MINING OPERATIONS *of the* NEW CORNELIA COPPER COMPANY*

By G. R. INGHAM †

Determination Of Quantity To Be Moved By One Blast—Grade Stakes For Drilling Established Every Fifty Feet—Results Of Typical Blast Discussed—Track, Transportation And Steam Shovel Equipment—Itemized Costs For Annual Period Given

MINING operations at Ajo can be traced to the misty legends of the early Spaniards. In the south end of the present pit, old chicken ladders, reminiscent of those days have been dug up. However, authentic records date from 1854, when the first mining company was formed to exploit the ores of the Ajo district. Then followed the usual periods of activity and depression common to most districts, until the New Cornelia Copper Company acquired control in 1911. The success of the district dates from this time.

The New Cornelia Copper Company started an active development campaign to determine if there was sufficient tonnage to justify the building of a railroad and the plants necessary to treat ores of this grade. Diamond drills were used and the results were checked by test pits in the carbonate ore and drifts and raises in the sulphide ore. The campaign developed sufficient tonnage to warrant the construction of the railroad and leaching plant for carbonate ores and later a concentrating plant for the treatment of sulphide ores.

The size, topography and absence of an appreciable overburden naturally led to the adoption of steam shovels for mining. The following practices were instituted; the banks, wherever practical, to have a height not to exceed 30 feet. All classes of mechanical equipment such as shovels, locomotives, cars, etc., to be of the same design and all wearing parts that necessitate constant replacement to be standardized for each class. The use of air drills for drilling banks for blasting was adopted.

Each bank in a pit presents its own particular problem; however, there are fundamental limits and definite objects to be attained that are common to all. The limiting feature is the amount of ground that can safely and successfully be shot in one blast.

There are two major limits that determine the size of a blast—first, the number of exploders that can safely be detonated; second, the time required to load, especially in wet ground, though even in reasonably dry ground there is a slight loss of powder strength if it remains a considerable length of time in the powder pocket.

Between blasts there is a rib that is usually harder to dig than in the blast proper; therefore, each section of bank to be shot should be of as great length as possible. On the other hand, a wide blast, especially in very hard ground, gives much better fragmentation than a narrow blast, due to the fact that the powder in the center of a shot is more evenly distributed and shatters more than either the face or bank side.

The face opens up along the seams and is thrown forward, leaving large boulders which are on or near the surface. These boulders are broken by drilling small plug holes and blasting. The bank-side also opens along seams and leaves large and blocky ground, this being behind blasted ground, only the boulders near the surface can be broken before the shovel exposes them. In our practice here the number of exploders used in a single blast should not exceed 125. From these limits, the standard blast will be 90 to 100 feet wide and from 200 to 300 feet long, depending on the hardness of the ground, which determines the spacing of holes. The present discussion is based on the fact that all banks have been faced up by shovel before drilling starts, as this is essential in hard ground.

Cushion blasting, that is blasting behind ground already shot, has some advantages, and this method is employed in the softer rocks, though not to any great extent.

The spotting of drill holes on a bank that is not faced up is largely guess work. Unless the rock is quite soft, there will be a hard zone for the entire length of blast, which will necessitate much secondary blasting and delay to shovel that more than balances the lessened throwing forward of material blasted.

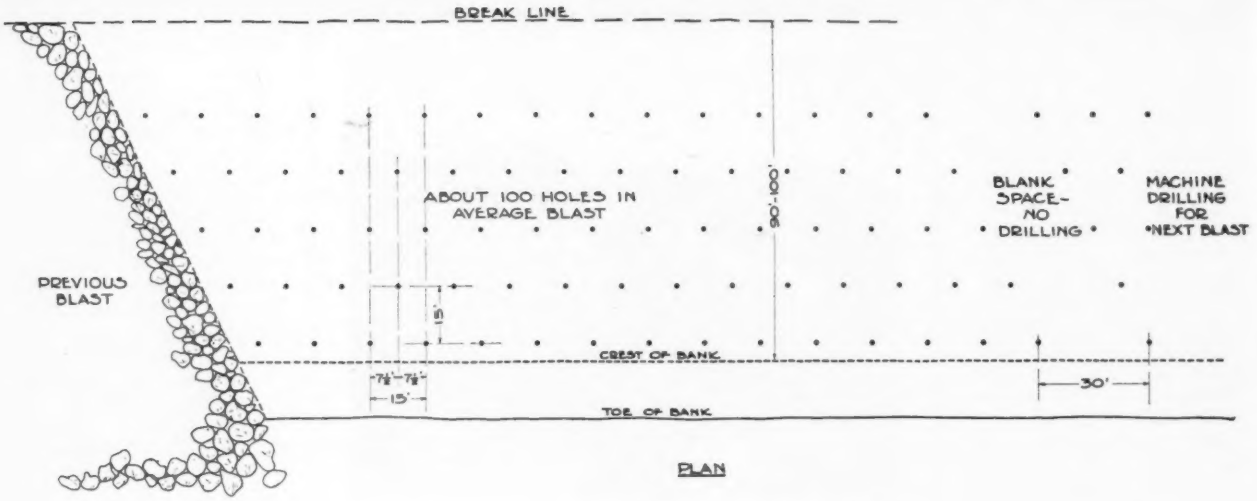
All banks are carried on a predetermined grade, and at 50-foot intervals, grade stakes are established. The foreman marks each hole both for position and depth and determines the length of each shot. Each blast is drilled separately and a blank space is left between each blast. This prevents loss of holes drilled—and should there be a hard spot, this can be drilled and shot with the next blast. (See sketch of typical blast.)

After the foreman has spotted the holes, muckers clean off the loose material for the drillers, and in case the ground is fractured from previous blasts above, short lengths of 2½-inch pipe are used as casing. Where the ground is badly fractured or loose, the casings are hammered down, as the drill advances.

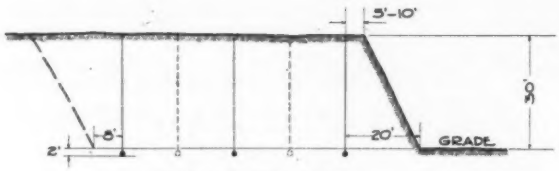
The drillers follow the muckers. A drilling unit consists of two machine runners equipped with one jackhammer, one tripod made of 1½-inch standard pipe, one set of block and falls using ¾-inch Manila rope, air hose with line oiler and blow gun for cleaning holes. Jackhammers in use at present are of three types: Ingersoll-Rand N72 drifter; Chicago Pneumatic No. 5, and Denver Rock Drill, model No. 60. These drills are equipped with spring handles and special blowing devices for this work. The

* Presented to the Arizona Chapter, Ajo Meeting, May 1, 1928.

† Mine Superintendent, New Cornelia Copper Co.



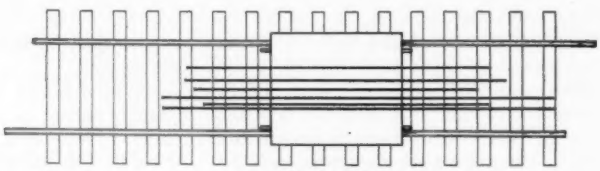
PLAN



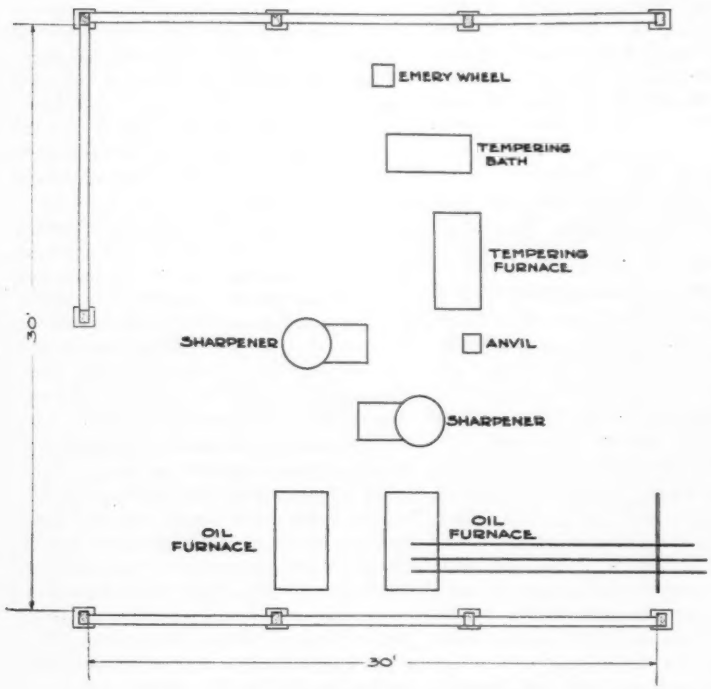
TYPICAL CROSS SECTION

ABOVE—SKETCH OF TYPICAL BLAST

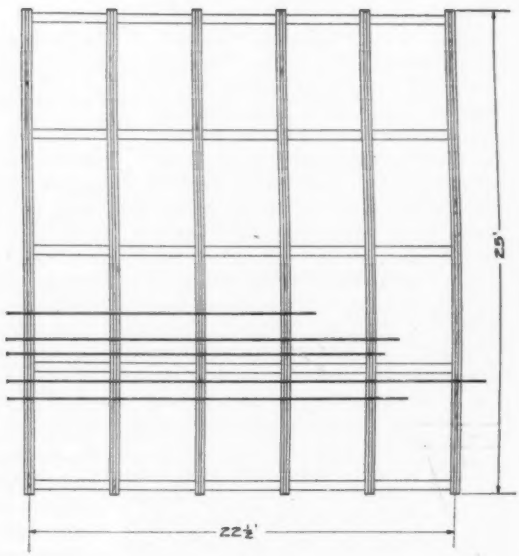
BELOW—SKETCH PLAN OF DRILL SHARPENING SHOP



DULL STEEL ON PUSH-CAR



DRILL SHARPENING SHOP



STEEL RACK

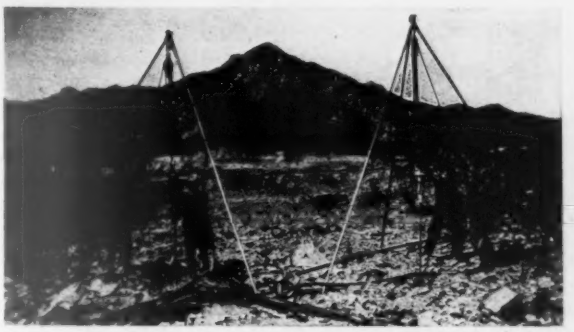
tripod is placed over hole and drill suspended from block and falls, which gives the drill runners easy control at all times and a wider range when changing steel.

The sharpening shop is located at the mouth of the pit in close proximity to tracks, and has the following equipment; 2 Ingersoll-Rand sharpeners, one, a model No. 50, sharpens the primary drilling steel, and the other, a model No. 5, sharpens the secondary or plugger steel. There are three oil furnaces, two for heating steel and one for tempering. The drill steel for primary drilling is 1¼-inch hollow round and the bits are gauged from 2½ inches on all starters up to 4-foot lengths. From this length the gauge is dropped one-sixteenth inch on each two-foot change down to 1½ inches on the longest steel, which is 36 feet long. All steel is delivered to drills from shop and dull steel returned by tool nippers using a push car.

All holes are drilled two feet below grade. The reason for this is, that as powder shoots away from a hard bottom at an angle, it would leave a series of hard nobs or ribs between each hole, if the powder pocket were placed on grade. Two feet below grade gives satisfactory results and leaves a very small amount of mucking for the next bench below. Spacing of holes varies; with the hardness of the material blasted; from 10 feet in the hardest ground to 20 feet in the softest. Should the holes be spaced too far apart, that is, more than double the distance (that the angle of the explosion two feet below the grade makes with the grade line), hard nobs will result. The spacing of holes according to hardness of ground and placing powder pockets two feet below grade has developed consistently good digging. The spacing of holes is from center lines through holes and not from hole to hole, as all holes are staggered. (See sketch of typical blast.) The first row of holes or line nearest to face are closer to edge than these distances, to take care of the slope of the bank, which is seldom vertical. Should this slope be excessive, short toe holes are placed in the wide parts, but this is seldom necessary. The front line is used as a base and all other lines are spaced standard from this. Considerable judgment is necessary in spotting the first line of holes. These spacings are for a standard 30-foot bank; naturally on lower banks the spacing will be proportionately less. (See sketch of typical blast.)

A powder crew consists of one powder man and two helpers. They are equipped with air hose, tamping sticks, wrenches, etc. Powder and tamping are delivered to them by powder nippers on a push car. Three kinds of powder are used; for springing, 1⅛-inch 50 per cent gelatin stick powder is used; for blasting in dry ground, 40 per cent granular powder known as Quarry Special No. 1. This powder is fairly free running and has many advantages over the stick powder, as it can be loaded much faster. In wet ground, standard 1⅛-inch 40 per cent gelatin stick powder is used. All powder is placed in a prepared pocket at the bottom of hole, which is made by springing with increasing amounts of powder. In this process the hole is deepened a few inches, as it is best to have the powder pocket well below grade

Above—Shovel operating in 30-ft. bank. Center—Drills in operation. Below—Shovel operating in drop cut



and have no powder in the barrel of the hole. The number of springs required to form a pocket varies with the hardness of the ground. Usually two springs are sufficient, but in some ground six springs are necessary. There are several devices for determining the size of the powder pocket, but in air drill holes of small diameter, none of them are very practical and the method used here is the ratio of the first spring to the second; that is, if two sticks on first spring will make a pocket large enough for 10 sticks of powder, the ratio is one to five, and will hold fairly consistent for all following springs.

The first spring is usually two sticks with about two ft. of tamping. After shooting, the tamping is blown out by air and the pocket filled with powder. Care must be exercised not to let any powder rise above the top of the pocket. The filling of the pocket gives the springing ratio of the ground, as before stated. A larger amount of tamping is used and hole again shot. Should the ratio be too small to make a pocket ample for the desired load, springing is continued until the proper size has been obtained. The amount of tamping varies, but there should always be enough to keep the powder down, that is, to get the full benefit of the explosion in the powder pocket and also prevent ravelling the barrel of the hole as much as possible. Springing is carried on over as large an area as practical in rotation, so that after blowing out all holes sprung, sufficient time has elapsed for the first holes sprung to be cool enough for either loading or another spring. The entire blast is sprung and cleared of tamping so that loading may proceed as rapidly as possible.

Primers are made of a single stick of gelatin powder; one No. 8 electric exploder is inserted in end of powder and wires hitched to it. In bad ground, one primer is placed in the bottom of pocket before the powder, then the pocket is loaded and another primer is placed on top. Where the ground is dry and free from ravels, only one primer is necessary.

The shattering effects of powder will only extend a certain distance from the powder pocket. In very hard ground where the holes are more than 20 ft. deep, there is often left a large number of boulders and sometimes a hard shell about 12 ft. above the powder pocket. To remedy this after the pocket has been loaded, the hole is tamped half way up. At this point the hole is filled for about 18 in. with 10 to 20 sticks of 50 per cent gelatin powder and the balance of hole tamped to surface. When this auxiliary pocket is used, the bottom pocket always has two primers and one in the auxiliary pocket. When all holes are loaded, lead wires of No. 10 insulated copper wire are strung between the holes and tested. The switch is near the main power line and at a safe distance from the blast. The exploders are then connected in parallel and blast fired. Banks are inspected and loose casings and wires removed.

The amount of powder loaded in each hole naturally varies on different banks and quite often on the same bank, but seldom in an individual blast. However, it is always advisable to slightly overload a blast than to underload it. If a blast has been underloaded, there will be an excess of large boulders and hard bottom that will require secondary blasting, with the resultant delays to shovels.

As a base to govern all loading, the rock is graded into three classes; hard, medium and soft. The base load for the three classes is: Hard rock, one lb. of powder to two tons; medium, one lb. of powder for three tons; and soft, one lb. of powder for four tons. This is a slight overload, but with this as a base and some experience, the exact amount of powder can quickly be determined for each class of material. The first row of holes or row nearest the face varies in amounts due to irregularity of toe, but all back holes are loaded the same. The calculated loads do not take into consideration any back break; however, there is always a large tonnage broken beyond theoretical lines, and the actual tonnage mined will be greater than the calculated. For the year 1927 there was mined 4.22 tons per lb. of all powder used.

Secondary blasting includes some bulldozing, plug holing boulders in blasted banks, hard nobs in front or side of shovel cuts. For this work light jackhammers are used. The type now used is the Waugh model 95.

The sampling for ore control is done by collecting the cuttings from the drill holes as they are drilled for blasting. These samples are taken at 40-ft. intervals along each bank and from one to four holes wide are sampled, depending on width of blast.

The cuttings are collected by placing a discarded filter blanket around the collar of the hole. On top of this is an inverted cone, made of galvanized iron, with a hole in the top for drill steel to pass through. Cuttings blown from hole are collected by cone on blanket, and an accurate sample is obtained. This method has proved to be very satisfactory. In addition, grab samples picked at selected intervals on each car are taken at crushing plant, prior to dumping, and give a good average check for mill purposes.

Some prospecting is also done by air drills and cone. The results are accurate and can be obtained at a very reasonable cost, to a depth of 30 ft.

Seventy-pound rails and 8 x 8 x 8 crossties are used throughout. The crossties are either native pine or Oregon fir. Tie plates are used on all ties. Sharp curves and lead rails on switches are usually equipped with gauge rods. Rail joints are laid staggered and all shifting and moving are done by hand labor.

The mine is connected to crushing plants with a double track system. The present approach to pit is temporary and will be abandoned as soon as the new approach is completed, which will be in 1929.

The new approach will have an adverse grade of 2 per cent, which is compensated on all curves. This can later be increased to 3 per cent maximum, and this grade will bottom nearly all the known ore in the pit. All levels in the mine are permanent, and the new approach will gradually connect up to them.

When a cut is completed, the shovel is moved back on loading track and cut in at beginning of new cut. Then tracks are either lined over to a new position along blasted bank, or are torn up and relaid. The latter method is usually employed, since it saves considerable grading and gives a better track. Some track laid in panels using a Brown hoist has been laid at different times, but is never as satisfactory as staggered joints and relaid tracks.

The track gang in the mine consists of one general foreman, one foreman, two subforemen and 40 men.

The mine is equipped with seven Osgood No. 105 railroad type steam shovels fired with crude oil. The equipment of all shovels is standard and is as follows: Four-cu. yd. dipper, 19-ft. dipper sticks and 30-ft. boom. They move on sections made of 70-lb. rails. Manganese is used wherever it is practical; all dippers, dipper teeth, racking pinions and racking being of this metal.

The crew consists of one runner, one craner, one fireman and four pitmen. One of the pitmen also acts as a powder man and does all secondary blasting of boulders or hard nobs in the bottom. At the present time 11 shovel shifts are operated; four day, four night and three graveyard.

Fueling of shovel is accomplished by attaching a three-in. hose to flange connection of locomotive tender, and oil pumped from locomotive to fuel oil tank on shovel. The tank has a capacity for 1½ shifts and usually takes from five to 10 minutes to refuel. The tank on each locomotive has a capacity to fuel one shovel and leave sufficient for it to complete an eight-hr. shift.

All shovels are equipped with electric lights and current is obtained from the same power line that is used for blasting during the day.

Minor repairs are made by operating crews between trains. Heavy repairs, moving of all shovels, washouts, etc., are handled by the repair crew. Shovels

are usually washed out about once each 30 days.

The mine is equipped with seven American Locomotive Company's locomotives of the switch engine type and fired with crude oil. The weight on drivers is 134,000 lbs; tender 88,800 lbs., and maximum tractive effort, 28,700 lbs. Tank capacity, 4,000 gallons of water and 1,500 gallons of crude oil.

There are 16 locomotive shifts operated; six day, six night and four graveyard. The spare locomotive is held in shops for overhauling and washouts.

The tender of each locomotive has a 3-in. pipe line for crude oil tank with flange connection at end for oiling shovels.

The crew consists of an engineer, fireman and brakeman.

Kilbourne and Jacobs air dump cars of 20 cu. yd. capacity are used. Each locomotive handles six-car trains and trains when loaded go to crushing plants, are dumped and, returning to pit, serve the shovels in rotation.

A permanent low-grade ore dump is connected to and located favorably for the new approach. The dump has two wings and the main track connecting both wings to approach system has a 2 per cent compensated adverse grade. The grade on dump is reduced to 1.40 per cent adverse grade, which gives the locomotive easy control while dumping cars.

The end of each wing is held to high ground at all times. This eliminates the expense of carrying a crib on the end, and delay necessary to plug end with partly loaded cars.

The cost per wet ton for mining and transporting ore to plants and low-grade ore to dump for the year 1927 is as shown below:

NEW CORNELIA COPPER COMPANY MINING AND TRANSPORTATION COSTS, YEAR 1927

CARBONATE ORE MINED	1,093,745	Wet Tons
SULPHIDE ORE MINED	2,320,190	Wet Tons
TOTAL ORE MINED	3,413,935	Wet Tons
WASTE MINED	1,019,163	Wet Tons
TOTAL ALL MATERIAL MINED	4,433,098	Wet Tons

	Labor		Supplies		Power		Total	
	Amount	Per Ton	Amount	Per Ton	Amount	Per Ton	Amount	Per Ton
Drilling and Blasting	$104,007 02	.024	$128,961.95	.029	$10,016.51	.002	$242,985.48	.055
Track Expense	26,175.20	.006	5,937.33	.001	.....	...	32,112.53	.007
Water Supply	3,474.13	.001	4 866.11	.001	.....	...	8,340.24	.002
Operating Steam Shovels	71,075.56	.016	51,502.52	.012	.....	...	122,578 08	.028
Repairs Steam Shovels	28,996.53	.007	36,415.62	.008	.....	...	65,412.15	.015
Transporting Ore	88,586.94	.020	61,113.68	.014	.....	...	149,700.62	.034
Pumping Expense	814.45	.000	642.22	.000	.....	...	1,456.67	.000
Repairs Dump Cars	15,065.99	.003	6,963.85	.002	.....	...	22,029.84	.005
General Mining Expense	420.80	.000	879.21	.000	.....	...	1,300.01	.000
Engineering and Assaying	18,870.86	.004	3 214.30	.001	444 07	.000	22,529.23	.005
Stripping Expense	103,766.08	.023	83,453.62	.019	3,144.77	.001	190,364.47	.043
New Approach and Waste Dump	59,746.63	.014	37,777.40	.008	.....	...	97,524 03	.022
Drainage	8,741.60	.002	2,114.74	.001	.....	...	10,856.34	.003
Drifting	5,588.80	.001	611.35	.000	.....	...	6,200.15	.001
Superintendence	18,154 30	.004	1.25	.000	.....	...	18,155.55	.004
Surface Expense	12,676.29	.003	1,445.32	.000	.....	...	14,121.61	.003
Handling Supplies	4,036.65	.001	255.64	.000	.....	...	4,292.29	.001
Total	$570,197.83	.129	$426,156.11	.096	$13,605 35	.003	$1,009,959.29	.228

Per cent of total cost for labor	56.46
Per cent of total cost for supplies	42.20
Per cent of total cost for power	1.34
Wet tons ore mined per man shift	30.88
Wet tons all material mined per man shift	40.10

MINING IN ALASKA IN 1927

MINES in Alaska produced $14,404,000 worth of minerals in 1927, as against $17,657,800 in 1926, according to an announcement made by the Interior Department through the Geological Survey. The total value of the mineral output of the territory since 1880 is $585,374,000.

The following table shows the value of the mineral output of the territory for 1927 and, for the sake of comparison, the production of the same minerals in 1926:

	1927 Value	1926 Value
Gold	$5,927,000	$5,707,000
Copper	7,250,000	9,489,000
Silver	356,000	430,500
Coal	548,000	459,000
Tin, metallic	34,400	10,400
Lead	127,000	124,400
Miscellaneous mineral products	162,000	444,500
	$14,404,000	$17,664,800

The most notable decrease was in the quantity and value of the copper produced, but there was also a considerable decrease in the output of gold and in certain of the substances, notably platinum metals, that have been included in the table as miscellaneous mineral products. The decrease in quantity of silver produced reflects in large measure the decrease in copper mining, as much of the silver is recovered from that source. That there was not an even greater decrease is due to the increased production of silver from the silver-lead ores, especially those of the Hyder district of southeastern Alaska. The quantity of lead was the greatest that has ever been produced in any one year, and the quantity of coal was exceeded in only one year since mining began in the territory and then by not more than 15,000 tons.

The decrease in production of minerals from Alaska, the department believes, is attributable not to permanent waning of the mining industry but to a number of causes affecting not only Alaska but the United States as well. One was the low price at which metals sold during 1927. This not only had the effect of cutting down the value of the product sold but also had an even greater effect in curbing production.

The decrease in output of gold is, according to this announcement, of course, not attributable to this cause. Instead it was due solely to the decrease in production from the gold placers, for the amount of gold recovered from the lodes increased somewhat. The explanation of the decrease in placer-gold production lies largely in the adverse climatic conditions that prevailed at almost all the placer camps throughout the territory during the season. The winter of 1926-27 had a very light snowfall, so that the run-off from the snow when it melted furnished unusually little water. Coupled with this, the early part of the open season was unusually dry, so that at many camps water for mining was not available until August.

About equal amounts of gold were derived from lodes and from placers. The bulk of the lode gold still continues to come from mines in southeastern Alaska, and they are increasing rather than diminishing their output. In addition, these mines are already yielding large quantities of silver and lead, and plans are under way for recovering zinc from the ores of the largest mine. The placer gold was produced from a number of camps widely distributed throughout the territory. About 58 percent of the gold recovered from placer deposits was mined by means of dredges. Twenty-eight dredges were mining in different parts of Alaska, and though mining of this type is generally less affected by adverse climatic conditions, even the largest dredge operators were so hampered in 1927 that they reported a marked falling off in production. Only one new dredge—that of the American Creek Dredging Company in the Hot Springs district of the Yukon—was built and began mining during the year. The large dredging enterprise in the Fairbanks district that has been in the course of development for several years reached such a stage that late in the year the material for the first two of the fleet of dredges that are to be built was delivered, and the dredges were set up during the winter of 1927-28.

The foregoing facts are taken from a report much more in detail on the mineral industry of Alaska in 1927, which is in preparation for publication by the Geological Survey.

METALLURGICAL DIVISION OF BUREAU OF MINES

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are also being used for developing a new method of recovering the manganese from the manganiferous iron ores of the Cuyuna Range.

Physical Chemistry of Steel Making: At the Pittsburgh Station, a five-year program of research on the physical chemistry of steel making, with special reference to the elimination of harmful inclusions in steel, was started one year ago, in cooperation with the Carnegie Institute of Technology and the iron and steel industry. The practical value of this fundamental research was so apparent that the industry itself contributed over $10,000 to the first year's program, and promises to increase this contribution some 50 per cent the second year.

Non-Ferrous Metallurgy

Modern non-ferrous metallurgy is really a branch of chemical engineering. The extraction of metals from their ores involves the common unit operations of chemical engineering, such as roasting, leaching, filtration, washing, calcination and distillation. These operations are based on chemistry and physics, and, therefore, a thorough knowledge of physical chemistry is a prerequisite for research in this field. The Bureau, recognizing the need of fundamental data on the physical chemistry of the metals, set aside one station, namely, the Pacific Station at Berkeley, Calif., for physico-chemical research. This location at the University of California is especially advantageous, as this institution is one of the foremost in the United States on research in physical chemistry. At the present time this station is determining with the highest possible precision the specific heats of the oxides of iron, lead, copper, tin and manganese. These data will be of general use in connection with the development of new metallurgical processes involving these metals.

The Intermountain Station at Salt Lake City, cooperating with the Department of Metallurgical Research of the University of Utah, is giving special attention to working out the fundamental physical chemistry of flotation, and the physics of crushing and grinding operations. The information thus gained will be of general value to the entire ore beneficiation industry in the development of improved processes by industry itself.

The Rare and Precious Metals Station at Reno, Nev., is concerned primarily with reducing precious metal losses in present milling practice and with cyanide recovery of precious metals associated with minor copper values. A cooperative study with the State of Nevada on oil bleaching clays of the State is also in progress.

At Tucson, Ariz., the problems naturally relate to the improvement in recovery of copper from low-grade ores. The present problems are on reactions in copper converters and heap leaching.

Ore Dressing and Milling

As previously stated, ore dressing and milling and the beneficiation of non-metallics constitute the entire work of the stations at Rolla, Mo., and Birmingham, Ala., and at the Field Station at Moscow, Idaho. The operators of the southwest Missouri lead district have co-operated whole-heartedly with the Bureau in plant research on milling, and this work has resulted in very material savings by reducing lead losses in the tailings. Likewise, operators of the Coeur d'Alene district of Idaho, cooperating with the Bureau's ore-dressing engineer at the University of Idaho, have made notable financial savings in improving methods of concentrating these ores. Plans are now being made to study milling practice in the Michigan copper district in cooperation with the Michigan School of Mines.

Non-Metallics

Non-metallic minerals, other than coal, cover an exceedingly wide field in the United States. Lack of means limits the Bureau's work to a relatively small portion of this field. At the New Brunswick Station notable progress has been made in the elimination of waste in slate-quarrying through the introduction of the wire saw. A study of the mica industry has aided in the reduction of mica wastes and a better understanding of methods of preparation of commercial products. Limestone mining, milling of fluospar, beneficiation of low-grade bauxite, beneficiation of phosphate rock, mineral pigments and potash recovery, are other problems now being studied in the field of non-metallic minerals.

The Metallurgical Division is somewhat unfortunate in comparison with other divisions of the Bureau, in that its work must be allocated largely to the small experiment stations, which limits the problems to those that can be conducted by one or two original investigators. However, in spite of this handicap, through whole-hearted cooperation of the industry, more has been accomplished than one would expect.

ECONOMICS BRANCH OF BUREAU OF MINES

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aside from the training and maintenance of a competent staff of workers. Those who themselves are most eager to obtain information are often most unwilling to give it. Nevertheless, and to say nothing of special studies, research and investigation, it is entirely possible for a clearing house of information to assemble an astonishing amount of valuable data from readily accessible sources, such as official reports of government agencies, corporations and others, the files of technical and trade journals, and the transactions of various societies, etc.

Likewise a very large proportion of current information of importance becomes quickly available through published reports and periodical news items, and in respect to each commodity there are generally a few important interests that are able and willing to furnish much supplemental information to government agencies with which they have close contacts.

It is a mistake to suppose, however, that merely because information exists in publications it may therefore be assumed to be available. It may not be available in fact, without research so costly that this becomes impracticable for most individuals. Much important data is recorded so casually or so briefly that it is not indexed in any way. Even specialists in the subject concerned may recall the substance of a fact without remembering its details accurately and without knowing where to find, or even where to look for it when it is needed, and it becomes increasingly evident that information available from numerous sources requires splitting up into topics carefully classified for reference in indices and files in order to render it readily and surely available. The Economics Branch has started work on this task.

It is my hope that in a relatively short space of time the branch will be able to publish information circulars on all mineral commodities, briefly summarizing the salient facts and the world setting of each as a first step in its program of service. These will be mimeographed to permit ready revision in response to comments, suggestions and criticism received from the public and those best informed in the industries concerned.

At the same time there will be carried on a systematic survey by means of which current information on the mineral commodities may be obtained, verified and rendered available for the use of the government, the mineral industries and the public.

We do not wish to promise too much at this time, but it seems evident that subsequent to the accomplishment of these two fundamental steps, the possession of well ordered data will inevitably make possible a great variety of studies leading to special monographic presentations or to individual advice that will be of interest and real value to industry, to Congress, to the departments concerned with the national defense and to other branches of the government, as well as to the interested public.

MANGANESE SHIPMENTS DECREASE SLIGHTLY IN 1927

THERE was relatively little change in the shipments of manganese ore containing 35 percent of manganese or more in 1927, according to the Bureau of Mines. The shipments of this grade amounted to 44,741 long tons, valued at $1,151,918, in 1927, compared with 46,258 tons, valued at $1,228,663, in 1926. Shipments of metallurgical ore totalled 27,730 tons, valued at $446,781, and of chemical ore totalled 17,011 tons, valued at $705,137. This is an increase of 1,200 tons in metallurgical ore and a decrease of 2,700 tons in chemical ore shipments. The principal changes in shipments in the various States consisted of increases of 1,200 tons in Arizona, 2,400 tons in Idaho, 4,400 tons in Montana, and nearly 600 tons in Virginia, and decreases of nearly 2,800 tons in Georgia, 1,000 tons in Tennessee, and of 3,162 tons in Washington. A large part of the shipments from Montana was calcined rhodochrosite. The placing of this grade of material on the market indicates that the domestic production of manganese ore in 1928 will probably be materially increased. California, North Carolina and Washington, all of which shipped high-grade ore in 1926, made no shipments in 1927.

Shipments of ore containing 10 to 35 per cent of manganese were less than half as large as those in 1926, amounting to 148,291 tons, valued at $673,921, compared with 364,312 tons, valued at $1,179,429. The larger part of the decrease in shipments of this grade of ore is accounted for by the shipments in Michigan and Minnesota that were classed with ores containing over 10 percent of manganese in 1926, and in 1927 fell below 10 percent in manganese content. There were decreases, however, in total shipments of ore containing from 5 to 35 percent of manganese in both of these States. Shipments of ore containing 10 to 35 percent in Colorado increased from 2,925 tons in 1926 to 26,828 tons in 1927. New Mexico shipments increased over 4,500 tons.

Shipments of ore containing from 5 to 10 percent of manganese amounted to 1,310,127 tons, valued at $3,270,460, in 1927, compared with 835,412 tons, valued at $1,934,381, in 1926, an increase in quantity of 474,715 tons. This is entirely accounted for by Michigan and Minnesota ore that contained just over 10 percent of manganese, and Wisconsin ore that contained just under 5 percent manganese in 1926, falling into the 5 to 10 percent class in 1927.

MANGANESE ORE IMPORTED INTO THE UNITED STATES, 1927*

(General Imports)

Country	Manganese content long tons	Value
Africa (British:		
South	.....	.....
West	42,172	$478,214
Brazil	78,608	1,584,836
Canada	228	9,660
Chile	1,470	36,054
Cuba	4,211	141,836
Germany	37	4,331
India (British)	47,863	1,185,610
Italy	.....	.....
Java and Madura	863	42,276
Netherlands	.....	.....
Norway	.....	.....
Russia in Europe	133,159	5,000,279
United Kingdom	25	3,920
	308,630	$8,487,016

*According to the Bureau of Foreign and Domestic Commerce.

MANGANESE AND MANGANIFEROUS ORE (Exclusive of Fluxing Ore) SHIPPED FROM MINES IN THE UNITED STATES IN 1927, BY STATES, IN LONG TONS.

STATE	Ore containing 25 percent or more of manganese			Ore containing 10 to 35 percent of manganese			Ore containing 5 to 10 percent of manganese	
	Number of shippers	Shipments	Value	Number of shippers	Shipments	Value	Shipments	Value
Metallurgical:								
Alabama	2	*	*	2	*	*	.....	.....
Arizona	3	3,905	41,880	1	179	754	.....	.....
Arkansas	8	2,605	64,202	6	7,444	48,678	.....	.....
California	....	.....	.....	.....	.....	.....	.....	.....
Colorado	1	*	*	5	26,828	126,938	.....	.....
Georgia	2	489	*	16	20,015	135,606	*	*
Idaho	1	3,181	50,900	.....	.....	.....	.....	.....
Massachusetts	....	.....	.....	1	*	*	.....	.....
Michigan	....	.....	.....	1	14,763	*	59,976	*
Minnesota	....	.....	.....	1	6,276	22,272	934,599	2,169,779
Montana	4	10,124	158,900	2	*	*	.....	.....
Nevada	3	1,357	16,976	2	3,310	*	.....	.....
New Mexico	3	2,190	37,237	1	56,624	*	*	*
Tennessee	3	498	8,182	3	487	3,442	.....	.....
Utah	1	*	*	4	*	*	.....	.....
Virginia	5	2,583	48,860	3	1,029	7,500	177	*
Wisconsin	....	.....	.....	.....	.....	.....	284 470	818,604
Undistributed	....	798	19,644	.....	11,336	328,731	30,905	282,077
	36	27,730	446,781	48	148,291	673,921	1,310,127	3,270,460
Chemical:								
Montana	†2	16,382	705,137	.....	.....	.....	.....	.....
Virginia	1	629		.....	.....	.....	.....	.....
	3	17,011	705,137	.....	.....	.....	.....	.....

* Included under "Undistributed."
† Mils through which all shipments were made. Individual producers not counted.

The figures on shipments of manganese in Alabama, Georgia and Virginia, and manganiferous ore in Wisconsin, were collected in cooperation with the State Geological Surveys.

GYPSUM IN 1927

THE gypsum industry in 1927, though very active, was not quite so productive as in 1926, according to a statement made public by the Bureau of Mines, based on reports received from 60 operators in 17 states and collected in cooperation with the Geological Surveys of Iowa, Kansas, Michigan, New York, Oklahoma, Texas, and Virginia.

The quantity of gypsum mined in the United States in 1927 was 5,346,888 short tons, a decrease of 288,553 tons, or 5 percent, compared with 1926. This production has been exceeded only in 1925 and 1926 and was about twice as large as that of 1917.

The total value of the gypsum sold or used by producers was $42,174,454, a decrease of $4,546,765, or 10 percent, compared with 1926. The quantity of gypsum sold by producers without calcining in 1927 was 965,371 short tons, a slight increase over 1926, and was valued at $2,388,663, or $2.47 per ton, a decrease of 14 cents per ton; the quantity of calcined gypsum sold or used by producers was 3,912,211 tons, a decrease of 103,763 tons, or 3 percent, and was valued at $39,785,791, or $10.17 per ton. This was a decrease of 10 percent in total value and 84 cents per ton compared with 1926.

New York continues to be the largest producer of gypsum. The production of crude gypsum in that state in 1927 was 1,675,501 tons, a decrease of 3 percent from that of 1926. This was nearly one-third of the entire quantity mined in the United States and more than twice as large as that of the second state, Iowa. New York is also the larger seller of gysum, marketing 290,368 tons without calcining, or 30 percent of the United States total, and 1,291,967 tons calcined, or 33 percent of the total. These figures represent a decrease of 11 percent in the uncalcined and an increase of 4 percent in the calcined gypsum compared with 1926. Other important states in the production of crude gypsum in 1927 were: Iowa, 792,159 tons; Michigan, 668,617 tons; Texas, 508,382 tons; Ohio, 474,320 tons; Nevada, 327,365 tons; and Oklahoma, 271,484 tons. The first five of these states reported 77 percent of the total production.

Newmount Option on Verde Extension Vacated

The option whereby the Newmont Corporation was to acquire the physical properties of the United Verde Extension Mining Company, together with its holdings of stock in the Nichols Copper Company and the Apache Powder Company in exchange for 60,000 shares of the stock of the Newmont Corporation has been canceled. This action was the result of the strong objection to the plan by many United Verde Extension stockholders. The cost of the examination of the United Verde Extension property will be assumed by the United Verde Extension Company.

New Cornelia Will Increase Concentrator Capacity

The first step looking toward increased concentrator capacity at the New Cornelia Copper Company will be the development of an additional water supply. New Cornelia's water supply comes from two 650-ft. wells located about 7 miles north of Ajo. The two wells are connected at approximately the 600-ft. level where there is a well-equipped pump station. Additional water will be developed by further drifting from the shafts within the water-bearing formation. Work on this program will begin soon. Additional pumping equipment will be installed.

Following the development of an additional water supply new units will be added to the concentrator so there may be no decrease in production when the oxidized ores are exhausted and the leaching plant ceases operation.

Operation of Carlisle Mine Temporarily Suspended

Operation of the old Carlisle mine near Duncan, Ariz., was suspended early in July. The operating crew was reduced to that necessary to operate the pumps and keep the mine unwatered. It is believed that the suspension of operations is temporary only as the results of exploration since the mine was reopened two years ago have been quite satisfactory. The erection of a 200-ton mill was planned early in the year but later postponed.

The Carlisle mine is in New Mexico, just across the line from Duncan, Ariz.

Kennedy Mine Will Erect Steel Headframe

Preliminary work for the erection of a steel headframe at the Kennedy mine, Jackson, Calif., has begun. The new headframe will replace a wooden headframe that has been in use for 25 years.

The Kennedy mine competes with the adjoining Argonaut mine for the distinction of being the deepest gold mine in the United States. It has been one of the steadiest producers of the mother lode mines.

Manganese Producers to Meet

The annual meeting of the American Manganese Producers Association will be held at the Mayflower Hotel, Washington, D. C., on Monday and Tuesday, September 10 and 11, 1928.

The success of the association and the progress of domestic manganese developments during the past year are well known. A review of the work of the past year and prospects for the future of the industry will be presented at this meeting. Interesting and enthusiastic sessions are anticipated. All members of the association and all persons interested in the development of American manganese are expected be present.

United States Closes Henryetta Zinc Plant

The American Smelting and Refining Company is closing down its zinc smelter at Henryetta, Okla. It is understood that the plant may not be used again. The company still has two active zinc smelters, at Amarillo, Tex., and Rosita, Mexico.

The plant at Amarillo is one of the newest smelters in the country, having been in operation several years. These smelters are operated by a subsidiary, the U. S. Zinc Company.

Closing of the Henryetta plant of the United States will not affect the ore production of the Tri-State district, as the plant has been running entirely on western concentrates for some time.

Anna Beaver Mill to be Reopened

The Anna Beaver Mining Company, Cardin, Okla., expects to reopen its mine on a limited operating basis, according to A. S. Winther. A large amount of work on the mill was found necessary after the six months' shutdown.

A shaft is being sunk on the Xavier land to the west of the Adams lease, near some good drill holes. The Adams mill is being operated on ore mined on the Mudd land.

COMMITTEE WORKING ON PROGRAM FOR WESTERN DIVISION MEETING

The program committee which is arranging the details for the annual meeting of the Western Division of the American Mining Congress at Los Angeles, Sept. 10 to 13, will provide for discussion of mining problems of general interest and of particular concern to western mines.

The subjects will include the mine managers cost control problem; underground ventilation problems; diesel engines as a source of power; the use and care of rock drills; underground haulage; mining methods; central power plants for mines; hoisting methods; the use of scrapers in underground loading; mine shafts; mine purchasing policies; treatment of oxidized ores, and general mining, milling and smelting problems.

The various groups of mining interests in the western States have been asked to select speakers for the convention. These include the following: The Copper Queen Branch of the Phelps Dodge Corporation of Arizona; The Homestake Mining Company of South Dakota; The Anna Beaver Mines of Oklahoma; The Portland Gold Mining Company of Colorado; The Anaconda Copper Mining Company of Montana; The Nevada Consolidated Copper Company; The Coeur d'Alene District of Idaho; The Utah Copper Company; The Argonaut Mining Company of California and the California Metal and Mineral Producers Association.

Among those who have been tentatively suggested as speakers at the convention are: Charles E. Le Grand, H. H. Pratt, T. O. McGrath, Charles F. Sternbach, J. S. Finlay, A. J. McLean, George H. Wigton, and O. McCroney.

Lead Producers Forming Association

Formation of the Lead Industries' Association, an organization similar to the Copper Institute, which probably would include virtually all producers of lead in the United States, Mexico and China, and the bulk of manufacturers of lead in this country is reported to be in progress.

Preliminary meetings have been held, it was said, and plans are going along satisfactorily; but it is not expected final steps will be taken before the fall. The association would gather statistical information on lead and its membership would include fabricators as well as producers.

It was disclosed at the annual meeting of the American Zinc Institute, held in St. Louis last April, when P. B. Butler suggested the combining of the lead and zinc interests in an enlarged American Zinc and Lead Institute, that the lead interests were working on an organization of their own.

Huge Investment in Canada Mines

Capital employed in Canada's mineral industry increased $17,850,000 last year, according to preliminary report by the Dominion Bureau of Statistics.

There were 10,256 metal mines, metallurgical works, coal mines, oil and gas wells, other non-metallic mines and quarries, cement plants, lime kilns, brick and tile plants and sand and gravel pits in operation in Canada during 1927. Capital employed, as represented by cost of properties, plant and liquid assets, amounted to $706,602,942; employes numbered 82,530; salaries and wages totaled $103,432,019; and net value of sales from these various mining and metallurgical industries was $248,385,031, or 4.6 percent more than in 1926.

Capital employed in the 1,553 plants representing the metal mining industry totaled $332,820,985. Metal mining and non-ferrous metallurgical industries employed 25,985 people throughout the year and provided $40,400,790 in salaries and wages. Sales from non-ferrous metallurgical plants less estimated cost of ores treated realized $45,479,578.

Fuels group included 5,524 plants, representing capital of $223,539,033, employed 31,754 people, disbursing $41,147,075 in salaries and wages. Sales of coal, natural gas and crude oil returned $67,388,065 to the operators of 3 percent over 1926.

Capital in 165 non-metal mining industries amounted to $53,978,623, employes numbered 5,989, and wages totaled $6,624,902. Sales from mines of this group realized $17,426,546, increase of $900,000 over 1926.

Clay products industries and other structural materials plants, such as those producing cement, lime, sand, and gravel, numbered 3,014, represented capital of $96,264,292, employed 18,802 people, paid $15,259,252 in wages, and produced products sold for $42,886,494, increase of $2,000,000 over preceding year.

International Nickel is to Build New Smelter

A new smelter with a capacity of 3,000 tons daily is to be erected by the International Nickel Company in the Cobalt district, Ontario, in addition to a 4,500-ton concentrator. These plants are being built, it is said, to take care of production from the Frood mine, and they are to be completed in 18 months, with a cost somewhere between $7,000,000 and $9,000,000. The present capacity of International Nickel is 2,000 tons daily, with no provision at present for concentration of ore.

Consolidated Lead & Zinc Buys Domada Mining Company

Sale of the three mines of the Domada Mining Company, Cardin, Okla., and the Mary M. tailing mill to the Consolidated Lead & Zinc Company was announced recently. The three mines involved are the Domada, Jack and Jill, and Kitty. The Domada mine, located south of Cardin, has been one of the most productive in the Picher district. The Jack and Jill and the Kitty leases each consist of 40 acres. The Mary M. plant was recently built on the Kitty property, and is retreating the slimes and fines from the Kitty mill, and eventually was to treat the Kitty tailings.

Iron Mountain Lead and Zinc Company Buys Empire Zinc Mine

The Empire zinc mine, southwest of Baxter Springs, Kans., has been purchased by the Iron Mountain Lead & Zinc Company for a consideration said to be between $300,000 and $400,000.

The Iron Mountain Company, formed to purchase the Empire, consists of investors from Iron Mountain, Mich. John Reigart, formerly connected with the Henry Ford iron mines in Michigan, will move to the district as manager.

The Empire mine, with its 80-acre lease, was the property of F. W. Evans, of Picher, Okla. The concentrator on the property was built last year, following the destruction of the old mill by fire.

Oklahoma Compensation Insurance Rate Down

Effective September 1, compensation insurance rates in Oklahoma will be reduced 4 percent, according to an announcement made by J. D. Conover, secretary of the Tri-State Zinc and Lead Ore Producers' Association.

SILVER, COPPER, LEAD, AND ZINC IN THE CENTRAL STATES IN 1927.

The following statistics of silver, copper, lead, and zinc in the Central States in 1927, compiled by J. P. Dunlop, of the United States Bureau of Mines, Department of Commerce, give the production, value, tenor of ore, and average prices for the various states and for the large mining regions.

TENOR OF CRUDE LEAD AND ZINC ORE AND CONCENTRATES PRODUCED IN THE PRINCIPAL REGIONS OF THE CENTRAL STATES IN 1927

	Northern Illinois	Wisconsin	Southeastern Missouri	Southwestern Missouri	Kansas	Oklahoma
Total crude ore and tailings milled.....short tons..	88,200	1,480,800	6,310,200	513,800	4,505,800	9,932,400
Lead concentrates in crude ore.....percent..	0.12	0.20	4.42	0.66	0.79	0.68
Zinc concentrates in crude ore.....do....	3.09	8.83	.....	5.31	4.70	4.07
Metal content of crude ore:						
Lead.....do....	.08	.14	3.17	.59	.62	.53
Zinc.....do....	.74	2.79	.....	3.21	2.76	2.36
Average lead content of galena concentrates.....do....	66.4	72.4	71.7	76.5	78.9	78.2
Average lead content of lead carbonate concentrates.....do....	.....	.....	.....	60.0	.....	.....
Average zinc content of sphalerite concentrates.....do....	23.6	31.6	57.5	58.3	58.8	58.1
Average zinc content of silicate and carbonate.....do....	.....	32.7	.....	38.2	.....	.....
Average value per ton:						
Galena concentrates.....	$72.74	$81.46	$83.62	$83.26	$88.30	$86.77
Lead carbonate concentrates.....	.....	.....	.....	60.00	.....	.....
Sphalerite concentrates.....	11.27	17.22	34.54	40.07	39.87	38.29
Zinc silicates and carbonates.....	.....	17.85	.....	26.26	.....	.....

The galena from southern Illinois (310 tons) had an average lead content of 67.4 percent, and that from Kentucky (241 tons) had 59 percent. Sphalerite from Kentucky had an average zinc content of 42.5 percent, and zinc carbonate concentrates (2,136 tons) had an average zinc content of 42.5 percent.

Copper ore from Michigan amounted to 7,581,234 tons and yielded 1.10 percent of copper. The quantity of concentrates produced from the treatment of this ore was 259,506,897 pounds.

CALIFORNIA NEWS NOTES

The Pat Holland group of mining claims on the South Fork of Coffee Creek near Carrville, Trinity County, has been sold to the Seymour Gold Placer Mines Company. The deal was closed through A. V. Seymour, of Vancouver, British Columbia, who had a bond on the property. Alf. F. Grade, M. E., and William J. Clement, also of Vancouver, are interested with Seymour. I. M. Zimmerman, of Los Angeles, is secretary of the company. The property will be operated on a large scale, work to start at once.

The California Gold Development Company has taken over the gravel property near Nigger Flat, El Dorado County, which consists of 700 acres owned by Warren C. Green. Dr. W. S. Lowe, Santa Ana, is president of the company; Max Bayha, Los Angeles, vice president, and Judge E. R. Dodge is secretary-treasurer. Nine men are now employed under the supervision of A. C. Lacy, veteran mining man of the Mother Lode.

The East Fork Mining Company, of Redding, Shasta County, has been issued a permit for the sale of 135,000 shares of its capital stock. The directors of the company are C. A. Westlake, John Smith, and E. C. Chenoweth.

An immediate increase in the milling capacity of the Brush Creek mine, Nevada County, has been ordered by President Ben F. Ballard, of the Kate Hardy Mining Company. Five stamps will be added, as the present equipment has proven entirely inadequate. Wm. Lichenberg is in charge of the work.

Two shifts are being run at the Gray Eagle mine above Downieville, Sierra County, by the Yellow Tiger Consolidated Mining Co., which has the property under lease. The ore on this property was considered too refractory to handle, which is the reason the property lay idle so long. The reopening of the property now depends on the results of the sampling. Gordon M. Bettles, of the Yellow Tiger, is superintending operations.

The Mayflower mine, Nevada County, has unwatered the Greenman shaft down to the 300-ft. level and work will be continued until the 400-ft. level is reached. A Cornish pump, electrically operated, is doing the work. A thorough examination of this property will be made in the interests of New York capitalists. Eight separate and distinct veins traverse this property. There is a 20-stamp mill on the ground.

The California Metal and Mineral Producers' Assn., 519 California Street, San Francisco, Calif., has for free distribution copies of the new revenue act of 1928, explaining the new basis for estimating mining depletion charges.

United States Company Options Gachi Property

The United States S. R. & M. Company has taken an option on the Gachi property near Arizpe, Sonora, Mexico. Exploration of the Gachi property has been in progress during the past year with encouraging results, and some good bodies of silver-lead-zinc ore have been developed. The ore occurs in limestone. The United States Company will begin active exploration within the next month or two.

The United States Smelting, Refining & Mining Company is making preparations for opening the Hidden Treasurer mine, a lead-zinc property eight miles southwest of Ouray, Colo., upon which it has taken a 50-year lease.

New Officers of Oliver Iron Mining Company

At a directors' meeting of the Oliver Iron Mining Company, held at Duluth on June 27, 1928, Pentecost Mitchell was elected president of the company to succeed W. J. Olcott, whose resignation was accepted.

J. H. McLean also offered his resignation as general manager for the company and Le Roy Salsich was elected as his successor. A. V. Peterson, of Coleraine, was made assistant to the president to succeed Mr. Salsich.

Jackson C. McChrystal Dead

Jackson C. McChrystal, a prominent Utah metal mine operator and member of a family conspicuous in the development of mining and business in the state for a half century, died suddenly in his apartments at the Hotel Utah, Salt Lake City, on July 10, of heart failure. He was born at Hancock, Mich., October 28, 1866, a son of the late John McChrystal, who came to Utah from Michigan in 1875. Jackson McChrystal was graduated from the Houghton School of Mines and, in association with other members of the family, participated in the development and operation of many of the leading properties of the Tintic district. He was president of the Godiva Mining Co. at the time of his death and was widely known in western mining circles as a successful engineer and operator.

Mrs. McChrystal and two children, Mrs. D'Etta Horne, of Vancouver Barracks, Wash., and Walter McChrystal, of Los Angeles, and two sisters and three brothers survive Mr. McChrystal. He was a director of the Utah Chapter, American Mining Congress, for several years, a member of the Alta, University and Country Clubs of Salt Lake City and of the A. I. M. E.

World's Largest Tin Smelter is Started

With 250 distinguished guests in attendance, numbering industrialists and members of the British Parliament, Lord Derby started the fires in Britain's new Penpoll tin smelter at Bootle in Lancashire July 12. The new smelter is the largest of its kind in the world. It is capable of treating half of the world's supply of tin ore.

The opening of the new works is considered extremely important by British industry, marking a long step forward in an effort to conserve tin resources through greater efficiency in smelting and also signalizing the intention of British tin-producing interests to consolidate production and refining under unified control. The new plant is controlled by the Anglo-Oriental combine through its subsidiary, the London Tin Syndicate.

Consolidated Coppermines Corporation

Consolidated Coppermines Corporation has let contracts to the Kansas City Steel Construction Company for new improvements, the completion of which should result in a material expansion in the company's operations, J. B. Haffner, general manager of the properties, announced recently. The contracts call for the construction of a steel headframe, steel machine shop, steel hoist house, and steel bins with a capacity of 5,000 tons. Construction work has already started on the machine shop and work on the other structures will be rushed.

Zinc Cartel Formed

Organization of an European zinc cartel is understood definitely to be under way. Nearly all European zinc-producing units were represented at a conference held recently at Brussels, at which it is understood a six months' operating agreement was reached between national associations of the industry.

Oklahoma Mine Tax Brings in $776,755

Mining companies in the Oklahoma section of the Tri-State district paid $776,755 in gross production taxes in the five-year period between June 1, 1923, and June 1, 1928, according to A. S. J. Shaw, state auditor.

Since the law was enacted, the state has received $68,578 and Ottawa County $114,939.

The tax paid so far in 1928 is $90,630, according to Mr. Shaw. The largest yearly collection was in 1926, when the tax brought in $18,091. From March to June, 1923, the tax netted $50,497. In 1924 the zinc and lead mines paid $130,593; 1925, $155,584, and 1927, $151,357.

King Coalition Mill Capacity 1,000 Tons Daily

New flotation equipment placed in operation recently at the Silver King Coalition mines at Park City, Utah, has increased the capacity of the plant from 600 tons to 1,000 tons per 24 hours. Twenty-eight MacIntosh flotation machines, each driven by an individual motor operating through a gear-reduction unit, are now used in treating the silver-lead-zinc ore mined at the property. Twenty of the machines serve as roughers, ten operating in the lead section. Four are employed as lead cleaners, and four as zinc cleaners.

Remodeling of the Silver King mill has been under way for several months, and, when completed, a No. 4 Symons cone crusher, in addition to the new flotation equipment, will be included in the flow sheet.

Western Taxpayers Conference

Keen interest is being manifested in the coming meeting of the Western States Taxpayers conference which will be held in Boise, Idaho, August 16 and 17. R. E. Shepherd, president of the Idaho State Chamber of Commerce, is president of the taxpayers conference.

It is expected a hundred or more delegates will be in Boise from the various states in the conference.

The program of this year's meeting has been issued from the office of the Secretary in Salt Lake City and it covers six sessions; morning, afternoon and evening of Thursday and Friday, August 16 and 17, respectively.

Members of the Advisory Committee of the Idaho Chamber of Commerce, which is backing the conference, include James F. McCarthy, Wallace, president and manager Hecla Mining Company, and Stanly A. Easton, Kellogg, vice president and manager Bunker Hill & Sullivan Mining & Concentrating Company.

Anaconda Increases Dividend Rate

The Anaconda Copper Mining has increased its quarterly dividend from 75 cents to $1 a share, having declared a payment of the latter amount to be made August 20 to stock of record July 14. This places the stock on a $4 annual dividend basis as against $3 previously. The current disbursement calls for approximately $3,300,000, and incidentally is the 100th dividend distribution by the company.

The Red Bird mine, located near Clayton, Idaho, which was taken over by the Ford Motor Company several years ago, is now idle after a period of development work in search of lead ore.

REPRESENTATIVES OF MINING INDUSTRY CONFER WITH INTERNAL REVENUE OFFICIALS ON DEPRECIATION

Representatives of the silver, lead, zinc, copper, iron, oil and anthracite and bituminous coal industries comprised a delegation on behalf of the American Mining Congress at a conference July 31 with officials of the Internal Revenue Bureau, in connection with a proposed study of the application of depreciation methods to the mining industry.

These men pointed out to the bureau officials the attitude of the mining industry towards the proposal of the bureau to fix standard rates for the determination of depreciation to the mining industry, and also its position regarding cooperation of the industry in making the study.

The bureau officials outlined the administrative problems involved in mine depreciation which they expect to simplify as a result of the proposed study. The purposes of the study and the principles and methods which will be applied in the consideration of variable conditions in different mines, plants and districts were also pointed out.

The bureau's invitation to the American Mining Congress to cooperate in the study will be submitted to the industry for consideration following the conference.

Eagle-Picher Lead to Reopen the Netta Mill

The Eagle-Picher Lead Company is repairing the Netta mill, in the Tri-State district, for an early reopening. The plant has been down for several months. The company's production will be maintained on a curtailed basis, company officials state.

Vieille Produces 7½ Percent World's Zinc

The annual report of the Societe Anonyme des Mines et Fondries de Zinc de la Vieille-Montagne of Belgium shows profit last year of 53,359,249 francs, just a few hundred less than the previous year despite much lower prices for zinc. Dividends were maintained. The company produced 100,513 tons of zinc, compared with 97,578 in 1926. The company's production was 7½ percent of the world total compared with nearly 8 percent in the previous year. Assets of the company are listed at 724,349,641 francs.

Steel Export Association Formed

The United States Steel Products Co. and the Bethlehem Steel Export Corp. have joined in the Steel Export Association of America under the Webb-Pomerene Act, and have issued invitations to various steel producers to join. Headquarters of the association have been established in New York City.

The organization of the new association is expected to bring to an end the differences between the Steel Corporation and Bethlehem with respect to freight rates on steel from Pittsburgh to the Atlantic seaboard in connection with steel exports.

Roy O. West Appointed Secretary of Interior

Roy O. West, of Chicago, has been appointed by President Coolidge to be Secretary of the Interior, succeeding Hubert Work, now chairman of the Republican National Committee. The new Interior Secretary is a lawyer by profession, although he has been identified with Illinois and national politics for a number of years.

Idaho Bureau of Mines

Appointment of Ernest W. Ellis, assistant professor of mining and metallurgy with the University of Idaho School of Mines, as acting secretary of the Idaho Bureau of Mines and Geology, has been announced by Governor H. C. Baldridge. Professor Ellis will direct the work of the bureau until such time as a successor to Dr. Francis A. Thompson as dean of the school of mines is selected. The new dean then will become directing head of the state bureau of mines and geology, as provided by the legislative act creating the bureau. Dean Thompson recently resigned to become president of the Montana State School of Mines at Butte. Professor Ellis has been on the staff of the Idaho mines school since 1923.

Constitution Announces Development Plan

The Constitution Mining & Milling Company recently announced its intention to carry on an extensive development program. This company has not been active since the fire that destroyed its surface plant last fall. The property is situated on Pine Creek in the Couer d'Alene district. Details of the refinancing plan are expected shortly.

Three Northern Iron Ore Mines Exhausted

Shipments of iron ore in 1927 from the Great Northern Iron Ore properties, on the Mesabi Range, Minnesota, totaled 7,786,065 tons, according to the twenty-first annual report of the trustees. The amount shipped in all years to January 1, 1928, was 153,357,558 tons. The merchantable ore bodies in the Smith, Dean and Boeing mines, were exhausted last year, and the leaseholds were surrendered to the fee owners.

The distribution to holders of certificates of beneficial interest was 75 cents per share in 1927, the same as in each year since 1925, and the total thus disbursed for the year was $1,125,000. The amount paid from December 7, 1906, to December 31, 1927, was $60,750,000. The trustees' balance sheet shows assets of $45,334,019.80.

David T. Adams Dies

David T. Adams, 69, pioneer of Minnesota iron mining fields and said to be the discoverer of the Mesabi range ore deposits, died July 22 at his home in Chicago. Following his discovery of the Mesabi deposit 35 years ago, Mr. Adams became associated with the Merritt interests, with which he remained many years.

Geophones and Telephones Offer Greatest Promise of Underground Communication in Mine Rescue Work

Two methods of underground communication seem to promise usefulness in the establishment of systems of communication between miners entombed following mine fires and disasters and rescue parties on the surface, according to the United States Bureau of Mines, which has conducted exhaustive studies of a number of proposed methods. The two systems regarded favorably by the bureau are, first, the geophone or earth-vibration method; and, second, the grounded line or roof rail conduction method of communication with telephones. All experimental work with radio gave quite negative results.

When mine disasters occur communication is vital, states L. C. Ilsley, H. B. Freeman, and D. H. Zellers, in a report just made public. In coal mines disasters are caused by explosions and fires and sometimes by large falls, cave-ins, or floods.

The chief purpose of the Bureau of Mines experiments in underground communication has been to seek out and, if possible, devise some practical means of communicating with entombed miners, not only to give them comfort and assurance but also to direct early rescue work which may save lives.

The problem of communication after a disaster has always been regarded by the bureau as extremely difficult to solve. The strata through which signals must be sent not only vary in depth but are made up of many kinds of earthy matter, often interspersed with water-bearing beds. Another difficulty is that apparatus used in mine-rescue work must of necessity be extremely simple and of light weight.

In the earth-vibration method looked upon favorably by the Bureau of Mines, the transmitter is a sledge or rock and the receiver is a geophone. The simplicity and availability of the transmitter are readily conceded. The receiver (geophone) is simple, but efficient operation requires a certain degree of skill. The greatest drawback to the geophone method is that voice communication is impossible, and the use of code to any extent is difficult.

The transmitter in the roof-rail system of communication, also regarded favorably by the bureau, is an ordinary microphone transmitter used straight or with amplification. This apparatus is fairly simple—in fact, simpler than the geophone—except possibly when amplification is used. The roof-rail method employs either voice or code.

The use of a combination method, however, would depend upon further development of these two systems of underground communication. The geophone has been developed so as to penetrate a depth of 550 feet without amplification. The few tests made with the telephonic method have shown the possibility of penetrating depths of more than 430 feet at a distance of more than 1,700 feet from the shaft with no amplification. Only enough work has been done on this latter system to indicate its possibilities.

Radio does not solve the underground communication problem, primarily not because the radio waves will not penetrate the earth (which they do to a considerable extent, depending inversely on the conductivity of the overburden), but because in the present state of development the apparatus is much too bulky for use under mine-rescue conditions.

Although signals have been received in mines at some depth in the eastern part of the United States, the reception was strongly suspected to have been carried into the mine through open shafts and over the wiring and piping systems.

Detailed results of these studies are given in Bureau of Mines Technical Paper 433, "Experiments in Underground Communication Through Earth Strata," which may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., at a price of 20 cents.

Personal Items

H. A. Leidich, mine superintendent for the Old Dominion Company, Globe, Ariz., spent the month of July in a trip to Utah and Colorado.

J. H. Hensley, Jr., has been made assistant manager of the Miami Copper Company at Miami, Ariz.

F. W. Maclennan, manager, Miami Copper Company, Miami, Ariz., is on a visit to eastern Canada and New York.

D. A. Hall, mining geologist and engineer of Berkeley, Calif., has returned from an extended stay in Sonora, Mexico.

A. M. Chisholm, director of the Shattuck-Denn Mining Corporation, recently visited Arizona districts.

Ed. Sweetman, mining engineer of Virginia, Minn., visited Utah mining districts in July.

J. E. Fisher, of Calumet, Mich., has been elected a director of the Calumet and Arizona Mining Company and the New Cornelia Copper Company.

A. W. Fahrenwald, metallurgist with the United States Bureau of Mines, has returned to Moscow, Idaho, from the Michigan copper districts where he has experimented with the flotation of native copper.

Clyde P. McCormack, mining engineer with Crowell and Murray, Cleveland, Ohio, was killed in an airplane crash on July 8. The crash occurred near Spring Lake, N. J.

W. S. Swart, of Duluth, consulting engineer for the Cusi Mexicana Mining Company recently visited the company's properties in Chihuahua, Mexico.

Pentecost Mitchell, president of the Oliver Iron Mining Company, was at Santa Barbara, Calif., in the latter part of July.

George W. Chamberlain, Hibbing, Minn., has been appointed chief engineer on the Cuyuna range for Pickands, Mather & Company, with headquarters at Crosby.

James Prendergast, who early this year took charge of anthracite sales for the M. A. Hanna Company, has been elected to succeed Richard F. Grant as president of the Susquehanna Collieries Company, the anthracite division of M. A. Hanna. Mr. Grant resigned as vice president of the parent concern in order to devote his entire time to the newly formed sales corporation of the Lehigh Valley Coal Company, of which he is the head.

P. S. Sprague has been appointed manager of bituminous sales of the M. A. Hanna Company, succeeding Hal E. Booth, who resigned to take the position of vice president in charge of sales of the Pittsburgh Coal Co. Mr. Sprague was formerly traffic manager of the company.

J. L. Bruce, resident director and general manager, Cyprus Mines Corporation, is leaving Cyprus on June 6 for five months vacation. His address while in the United States during July, August, and September will be care of V. G. Hills, 2678 Hudson Street, Denver, Colo.

Richard F. Grant, vice president of M. A. Hanna & Company, Cleveland, has been made president of the newly formed sales corporation of the Lehigh Valley Coal Company.

P. C. Thomas has resigned his position with the New River & Pocahontas Coal Company, and has gone with the Koppers interests.

Robert J. Montgomery, former vice president and general coal agent of the Philadelphia & Reading Coal & Iron Company, accompanied by Mrs. Montgomery, sailed the latter part of June for a two months vacation in Europe.

Dr. George K. Burgess, director of the United States Bureau of Standards, Washington, D. C., has been elected to honorary membership in the American Zinc Institute.

Franz Schwarzenberg, engineer for the Quincy Mining Company, Hancock, Mich., has been promoted to the position of chief mining engineer. He succeeds Nils Eilertson, who recently resigned to accept a position with the Horne Copper Company.

John R. Reigart, formerly in charge of the mining department of the Ford Motor Company, Iron Mountain, Mich., has resigned and accepted a position with the Iron Mountain Zinc & Lead Company, in charge of the Empire mine at Baxter Springs, Kans.

Karl L. Kithil, engineer and geologist of Denver, Colo., has been granted a patent on a seismo-vibrometer for use in geophysical prospecting.

James A. Stader has been appointed assistant to President R. M. Roosevelt, of the American Zinc Institute, and will shortly make a trip through the west in an endeavor to bring a closer cooperation between the western and eastern producers of zinc. Mr. Stader was formerly with the Economic Branch of the Bureau of Mines in Washington.

Grant B. Shipley, engineer of Pittsburgh, Pa., has recently been elected a director of the Mond Nickel Company, Limited, of England and Canada. For some time Mr. Shipley has been chairman of the board and president of the American Mond Nickel Company, the United States branch of the Mond Nickel Company, Limited.

Charles H. Dorrance, consulting engineer, Scranton, Pa., has been selected as president of the Racket Brooks Coal Company, Carbondale, Pa. He succeeds the late David Bois.

Willard R. Jillson, state geologist of Kentucky since 1910, has been reappointed to that office for another term of four years.

Horace F. Baker, president and chairman of the board of the Pittsburgh Terminal Coal Corporation, has resigned because of ill health. G. F. Downey, vice president, is acting as president.

E. H. Weitzel, of Pueblo, Colo., resigned as vice president of the Colorado Fuel & Iron Company, effective July 1. Most of the duties formerly performed by Mr. Weitzel as general manager have been taken over by W. A. Maxwell, Jr., who was made production manager more than a year ago.

MINE WORKERS ABANDON JACKSONVILLE SCALE—AGREE TO DISTRICT SETTLEMENTS

The United Mine Workers of America have abandoned the Jacksonville scale as a basis for wage negotiations in the bituminous coal fields of the United States, and extended to each one of its districts the right to make settlements with operators "upon a basis mutually satisfactory," a principle which operators have for years been endeavoring to obtain. This announcement was made July 18, by John L. Lewis, international president, after the Policy Committee of the organization concluded seven days of consideration of the position of the union in the present situation.

The scale of $7.50 per day and $1.08 per ton which is thrown into the gob was set up in 1920, and was reaffirmed in 1924 in the famous Jacksonville agreement. When the Jacksonville scale expired on April 1, 1927, some mines and districts, notably Illinois, agreed to an extension of the scale for one year, during which time futile efforts were made to negotiate a new and lower scale. Many mines either remained idle for the 15 months since the contract expired, or went on an open-shop basis.

The action of the Policy Committee will result in the existence of different wage scales in different districts and will be followed by the resumption of mining operations at properties which have been long idle. The officers of each district in the union are left free to negotiate for wages on whatever basis is "mutually satisfactory," their action to be submitted for ratification by a district convention or a referendum vote by the union miners in the district. The committee also authorized all district organizations to permit any coal company or any mine to employ all the men it may require for maintenance, repairs, development, construction or production of coal, providing the existing wage scale is paid temporarily until a district agreement is reached.

Railroads Settle Lake Cargo Fight

A compromise agreement has been reached by officials of northern and southern lake cargo carriers on a 35-cent differential as between freight rates on lake cargo coal from northern and southern bituminous fields.

Northern roads had fought for 45 cents differential, while southern carriers had held for 25 cents.

The recent rate cut by northern carriers increased the differential from 25 cents to 45 cents.

In the absence of any official statement after the conference, which was held in the office of W. W. Atterbury, president of the Pennsylvania Railroad, it was understood that the southern carriers, on the basis of the amicable settlement, will advance rates to Lake Erie ports to $1.81 a ton, under an agreement to refund 10 cents a ton on coal transported to destination north of Port Huron and Sarnia, Ontario.

Another point agreed upon was said to be that the refund clause of the northern and southern railroads would terminate on December 31, the effect of which would amount to $1.81 a ton from the Kanaoha-Thacker region and a rate of $1.46 from the Pittsburgh district.

The apparent settlement will end a drawn-out five-year contest which has involved large sums of money and an immense soft coal tonnage. The lake cargo traffic involves shipments of about 25,000,000 tons of coal annually from which a large revenue accrues to the carriers concerned. The traffic is considered as the most desirable of the coal markets of the United States, enabling the mines to keep in operation in the summer months when demand for coal in other sections of the country naturally is under normal.

Operators Appear Dissatisfied

Both the Northern and Southern operators have expressed dissatisfaction with the proposed compromise. The operators of the Pittsburgh district claim that a 45-cent differential is necessary if they are to compete with southern fields in the Lake markets. It is expected that they will protest the 35-cent differential when the schedules are presented for approval of the Interstate Commerce Commission. Southern operators plan to hold a conference to discuss means of meeting the situation. They have always contended that with the northern fields back on a competitive basis, it would be difficult for the southern fields to maintain their tonnage on even a 25-cent differential.

Ohio Coal Operators Meet

At the annual meeting of the Ohio Coal Operators' Association, held in Columbus, July 9, the following officers were elected for the coming year:

S. H. Robbins, Cleveland, president; George M. Jones, Toledo, and William Emery, Jr., Cambridge, vice presidents and George K. Smith, Columbus, secretary-treasurer.

The new board of directors consists of S. H. Robbins, W. L. Robinson, William Collins, W. R. Woodford, Ezra Van Horn, T. K. Maher, Alva Bradley, Whit-

ney Warner and F. E. Taplin, all of Cleveland; George K. Smith and P. C. Morris, Columbus; George M. Jones, Toledo; William Emery, Jr., Cambridge; W. L. Haskins, Coshocton, and T. R. Biddle, Athens.

The executive committee named consists of S. H. Robbins, George M. Jones, William Emery, Jr., William Collins, Ezra Van Horn, T. K. Maher, W. H. Haskins, and F. E. Taplin.

"The Ohio operators are well pleased with the progress accomplished by dealing directly with their own men on an open shop basis. Under the Jacksonville scale operators maintained they couldn't compete with southern mines and many were forced to close down," said George K. Smith, secretary of the Sunday Creek Coal Company.

"Under our present system the men are getting steady work. I believe that the open shop basis has thoroughly vindicated itself."

H. C. Frick Company Reduces Wages

The H. C. Frick Coke Company, subsidiary of the United States Steel Corporation, operating in the Connellsville region, has made an 11 percent reduction in wages. Since 1922 this company has been paying the equivalent of the Jacksonville scale, although operating nonunion. It was expected that this reduction would be made before this time, but evidently the company has been waiting until they were certain that the union had lost their foothold in adjacent districts. Approximately 35,000 men are affected in Allegheny, Fayette, Westmoreland and Greene Counties, but it is expected that the reduction will result in the resumption of idle mines and the employment of more men.

Old Ben Machine Miners Return to Work at New Rate

Machine miners at the No. 8 mine of Old Ben Coal Corporation returned to work the latter part of June under a new wage agreement, after a strike lasting four weeks. The men had signed an agreement with Old Ben providing for a flat rate of $10.07 a day, which union officials maintained was illegal, and when they went to work Harry Fishwick, president of the Illinois Miners' Union, called a strike. However, the men decided that they were satisfied with the agreement and returned to work. The strike did not affect any miners other than the machine men, and the new scale will probably be taken under advisement by officials of both factions.

Wheeling and Lake Erie Mines Prepare to Open

The Wheeling and Lake Erie Coal Mining Company plans resumption of operations at its No. 7 mine at Neffs, near St. Clairsville, Ohio, on an open-shop basis. The company is now operating three mines nonunion in the Eastern Ohio field. The Cambria Collieries Company is loading coal at its Wagon mine, about 80 men being employed. The McClainsville and Stewarts mines, of the Rail and River Coal Company; the Gaylord mine, of the Saunters Coal Company; and the Redbird mine, of the Warner Collieries Company, are preparing to run coal.

Coal River Collieries Co. is Adjudged Bankrupt

The Coal River Collieries Company was adjudged bankrupt July 16 by Federal Judge George W. McClintic, at Charleston, W. Va. J. T. Dunigan, president of the firm, and United States Marshall Seigel Workman were continued as permanent receivers.

The temporary receivers were appointed in July, 1927, after suit was filed against the company by the Brotherhood Investment Company, Cleveland, for $1,775,000 claimed to have been borrowed over a period of five years. Three creditors later filed an involuntary petition in bankruptcy against the company, which it contested, and Judge McClintic ordered an investigation of the company's properties. The receivers were authorized to continue operating the concern's mine in Boone County.

Neilson Colliery Resumes Operation Under Receivership

United States District Court has permitted a resumption of operations at the Neilson colliery of the Shamokin Coal Company which is under a receivership. The court was told that the company could pay off its obligations within 18 months if the mine was allowed to run.

Rockhill Coal & Iron in Receivership

The Rockhill Coal & Iron Company, Philadelphia, operating bituminous mines in Huntingdon, Fulton and Bedford counties, has filed a petition for a receivership in the United States District Court. The suit, a friendly one designed to conserve the assets of the company, was brought about by the De Laval Steam Turbine Company, Trenton, N. J., which has a claim of $4,565. Assets of the company are said to be worth at least $2,000,000, and among the obligations are outstanding first mortgage bonds of $2,157,000 on which interest of $65,000 will fall due September 1, and general liabilities of $350,000. The condition of the company's finances is attributed in part to the attempt to operate under the Jacksonville wage scale and the failure of the company officers, through no fault of their own, to make a new agreement with the United Mine Workers. J. William Wetter has been appointed temporary receiver.

Illinois Mine Dynamited

The Jonesville No. 1 mine of the La Salle County Carbon Coal Company, near La Salle, Ill., the largest mine in the northern part of the state, was dynamited early July 2, the blast shaking the country-side for miles around. The damage to the mine, which was to have been reopened on the following day under an agreement with the newly formed Mine Workers' Union of Northern Illinois, amounts to many thousands of dollars. The mine has been idle for a year.

Ohio Tipple Destroyed by Fire

Late in June, the tipple of the Rensi mine, located in Jefferson County, Ohio, was destroyed by fire of incendiary origin, with a loss estimated at $15,000. The mine had been operating on a cooperative basis for several weeks.

Lease Indiana Strip Coal Land

More than 7,000 acres of strip coal land near Cato, Ind., have been leased by the Mississippi Coal Corporation, at $80 to $100 an acre. The coal lies at depths of from 14 to 40 feet, and the vein varies from 4 to 6 feet. Work of testing the land has begun.

Jeddo-Highland Takes Over Hazle Brook Mines

The Jeddo-Highland Coal Company has taken over the mines of the Hazle Brook Company in Upper Luzerne County, Pa., which have been controlled by the Wentz family. The operations are the Upper Lehigh, Maryd, Girardville, Raven Run, Mid Valley and Hazle Brook. The new owners have reorganized the Hazle Brook Company by the election of the following officers: Donald Markle, president and chairman of the board; T. E. Snyder and A. B. Jessup, vice presidents; Walter M. Hindennach, secretary and treasurer; E. P. Hunphrey, general manager. Offices will be in Jeddo.

Ohio Coal Mine to Reopen

The Youghiogheny and Ohio Coal Company will open its Charleroi mine after a shutdown of 18 months. The mine will operate on an open-shop basis, and will employ between 450 and 500 men. The new lake cargo applications for reduced rail rates have given the industry an important impetus. River shipments are increasing in volume. Increased production is reported from mines since the reduction in freight rates.

Seek Changes in West Virginia Law

A complete new draft of the West Virginia mining law will be presented to the next session of the West Virginia legislature, according to Robert M. Lambie, chief of the State Department of Mines, dealing especially with the safety sections. Mr. Lambie points out that open lights must be replaced with approved electric lamps in order to check the present heavy toll in lives and property damage in West Virginia coal mines.

The following provisions will be sought: power for the department to compel rock dusting where necessary; the compulsory substitution of approved electric lamps for old-time lamps; compelling each miner to carry a "self-rescuer" while at work; the appointment of at least three expert electrical inspectors, and requiring all electrical equipment placed or replaced in the mines after the enactment of the law to be approved.

New Concern Takes Over West Virginia Properties

A new concern financed by Columbus, Ohio, capitalists and known as the Merrimac Coal Company, has acquired the plants and properties of the White Star Mining Company, at Merrimac, five miles from Williamson, W. Va. The daily capacity of the new company will be about 400 tons, and it is understood that the operation of the collieries will be continued practically along the same lines. George W. Gibbs, of Columbus, succeeds Ira McGlothin as general manager. Two mines are being operated at present, and about 100 miners are employed.

Explosion at Experimental Mine Kills One, Injures Two

An explosion in the chemical laboratory and explosive building of the Bureau of Mines experiment station at Bruceton, Pa., July 2 resulted in the death of Murray Riggs, chemist, aged 35, and the injury of Paul Guest, assistant electrical engineer, and Robert Kennedy, science aid, the former seriously.

Colorado Industrial Commission Answers Suit

The Colorado Industrial Commission has filed answer in the Denver district court to a suit brought by Charles Metz, of Fafayette, Colo., secretary of the miners' executive committee, in which the latter sought to compel the commission to publish its findings in regard to wages for Colorado miners. Metz contended that the failure of the commission to make a wage award was working a serious injury on the eight or ten thousand miners involved. The commission contends that no beneficial purpose would be served and that no one is being damaged by the failure to make known findings on the question of wages.

Hearings were conducted by the commission in various parts of the state this spring, and the commission says that these did not afford a basis for reaching a satisfactory conclusion. A report was made on working conditions by the commission, but the question of wages was not touched.

E. F. Burchard Succeeds W. A. Nelson as State Geologist of Virginia

Wilbur A. Nelson, State Geologist of Virginia since 1925, has resigned, and Ernest F. Burchard, of the United States Geological Survey, has been appointed to this position. The change was brought about by the adoption of a regulation by the Department of Conservation and Development providing for the separation of the Bureau of Geological Survey from the University of Virginia, and requiring the geologist to devote full time to the state's work. Mr. Nelson elected to remain at the university as professor of geology.

Mr. Burchard, the new geologist, is a graduate of Northwestern University and has been connected with the United States Geological Survey since 1911. In 1917 he organized war studies of the ores of ferroalloy metals. He is the author of several technical books and papers.

Anthracite Congress to be Held in Wilkes-Barre

Plans are being made for the Anthracite Cooperative Congress which is to be held in Wilkes-Barre, Pa., October 9, 10 and 11, and it is expected that 2,000 or so delegates will attend. The general sessions will be held in the evening, and at one session addresses will be delivered by prominent speakers, including William Green, president of the American Federation of Labor; John L. Lewis, president of the United Mine Workers; S. D. Warriner, president of the congress; and Richard F. Grant, representing the operators.

Colorado Fuel & Iron Adopts Group Life Insurance

The Colorado Fuel and Iron Company, of Denver, has adopted group life insurance for all employes in the organization. The Equitable Life Assurance Society has been named to underwrite the program, which involves approximately $20,000,000 of insurance.

By this action more than 11,000 employes located in properties stretching from Wyoming to the Mexican border are offered $1,000 to $2,000 of life and total permanent disability protection, varied according to length of service, at a low cost, by reason of the participation of the company in the premium. This protection also extends to all workers employed by the Rocky Mountain Coal and Iron Company, the Colorado Supply Company, the Colorado and Wyoming Railway Company, the Crystal River Railroad Company and the Colorado and Wyoming Telegraph Co.

Lehigh Valley Coal and Sales Company In Unification

Formal announcement has been made of a plan for unification of the Lehigh Coal Company and the Lehigh Valley Coal Sales Company through the formation of a new corporation, which probably will be known as the Lehigh Valley Coal Corporation. It was stated that the consolidation was proposed in the belief that unified operation would lead to increased efficiency and substantial economies.

Thomas W. Lamont, Theodore S. Barber and Richard F. Grant have consented to serve as a committee to receive deposits of certificates of interest in the capital stock of the Lehigh Valley Coal Company and deposits of stock of the Lehigh Valley Coal Sales Company. The committee has appointed J. P. Morgan & Co. as the New York depository, Girard Trust Company as the Philadelphia depository, and Miners Bank of Wilkes-Barre as the Wilkes-Barre depository. A plan and agreement for the consolidation has been approved by the directors of both companies.

Anthracite Coal Tax Repeal Sought

A movement to work for the repeal of the Pennsylvania anthracite tonnage tax at the 1929 session of the legislature was started in Wilkes-Barre, Pa., recently by Roy C. Haines, secretary of the Anthracite Cooperative Association.

Haines conferred with 16 legislative candidates and plans other meetings in the near future. The tonnage tax has been in effect since 1921.

Lack of Coal to Close Beaverbrook Mine

The Beaverbrook mine, operated by C. M. Dodson & Co. for years, is to be abandoned because of exhaustion of its coal measures, it was officially announced today by the firm. A large interest in the property belongs to the estate of the late Charlemagne Tower, Philadelphia.

The mines were first opened by French interests in the early fifties and after the failure of the company they had organized the Dodsons took control. About 500 employes will be affected by the closing down of the plant.

John Brydon Joins Staff of Pennsylvania Coal Company

J. C. Brydon has retired from his position as assistant to the freight traffic manager of the Baltimore & Ohio Railroad and has become general superintendent of the Pennsylvania Coal Company, with offices at Scranton, Pa. His jurisdiction includes also the subsidiary companies, the Hillside Coal & Iron Company, and the New York, Susquehanna & Western Coal Company, both anthracite, and the Northwestern Mining & Exchange Company and the Blossburg Coal Company, both bituminous. Michael Gallagher, of Cleveland, is chairman of the board and president of the Pennsylvania Coal Company and its subsidiaries.

Linton Coal Company Sold

Announcement has been made of the sale of the Linton Coal Company, with a mine near Linton, Ind., to the Little Betty Mining Company, with general offices in Chicago. M. L. Gould, long a prominent figure in the bituminous industry, was president of the former company, while Lyle H. Dayhoff, president of the Republic Coal and Coke Company, 28 East Jackson Place, Chicago, is president of the latter company. Mr. Gould will give his attention to his other business affairs.

Fuel Engineering Course in Second Year

So successful was the one-year course in fuel enginering established by the University of Fennsylvania, Philadelphia, last year that a similar course will be offered this year beginning October 1. Completion of the course will lead to the degree of master of science in fuel engineering. The course is intended primarily for those who have had the advantage of a complete undergraduate education of college grade and who have also had practical experience in fields allied to fuel engineering.

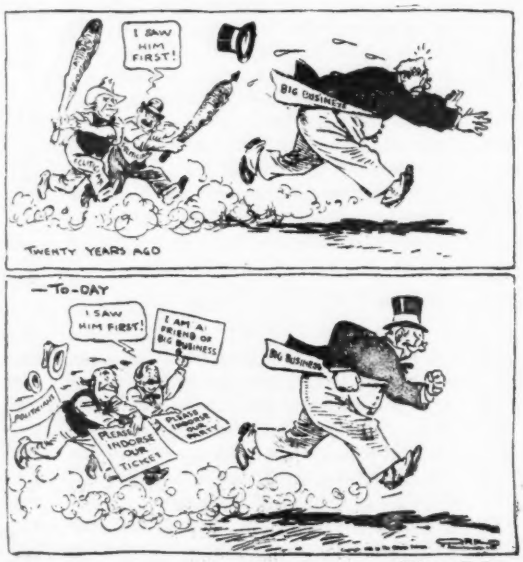
United Mine Workers Organizers in Colorado

Organizers of the United Mine Workers of America have started a drive in Colorado to reestablish that organization in the state. The aid of the national organization has been secured, with Percy Tetlow, Columbus, Ohio, and John Saxton, Salineville, Ohio, in charge of the work. The State Federation of Labor is cooperating in the work, which aims to revive mine workers' locals in every coal camp and then work out a state-wide contract with the operators.

Composition of Tar From Low-Temperature Carbonization of Utah Coal

A study of low-temperature carbonization of Utah coal from the Castle Gate bed conducted by the United States Bureau of Mines, in cooperation with the Carnegie Institute of Technology and the National Coal Association, permitted the collection of samples of tar, oil, gas and other by-products produced under definitely known conditions. The examination of these light oils, aqueous condensate and the various tar portions is in progress. The results of the examination of the liquid portion of the tar and also the total tar soluble in the aqueous condensate are given in Bulletin 35, "Mining and Metallurgical Investigations," by R. L. Brown, organic chemist, Bureau of Mines, and B. F. Branting, research fellow, Carnegie Institute of Technology. Copies of this bulletin may be obtained from the Carnegie Institute of Technology, Pittsburgh, Pa., at a price of 15 cents.

Rates on bituminous coal from mines on the Middle Creek Railroad in West Virginia, to interstate points are held unduly prejudicial, but not unreasonable by the Interstate Commerce Commission in the case of the Middle Creek Coal Company, et al. The commission says that the rates for the future will be unduly prejudicial to the extent that they exceed the rates contemporaneously maintained from Hartland, W. Va., and points on the Charleston division of the Baltimore & Ohio in the Kanawha district taking the same rates. The decision wipes out a 25-cent local rate that shippers on the Middle Creek Railroad have been required to pay.



The Chase

Chicago Tribune.

Coal Washing Studies

Further and more extensive studies in coal washing are to be made at the Tuscaloosa, Ala., experiment station of the Bureau of Mines. New equipment has been installed and Byron M. Byrd, who will conduct the research work, has been transferred from the bureau's station at Seattle, Wash.

The Importance of Mechanization

The importance of mechanized mining in the coal industry is pointed out by C. V. Beck of the Lumaghi Coal Co. of St. Louis, in a statement to the Senate Committee on Interstate Commerce in its investigation of the coal situation. Mr. Beck says coal mining is becoming thoroughly mechanized. "In order to have a competitive coal mine, each part of the mine and its mechanical equipment must be employed," says Mr. Beck. A competitive mine is described by him as a thoroughly mechanized property of 1,500 tons daily capacity. Mr. Beck furnished the committee with a classification of bituminous mines in states east of the Mississippi River according to their capacity and height of vein. These mines are in Pennsylvania, West Virginia, Maryland, Tennessee, Ohio, Alabama, Kentucky, Indiana, and Illinois, and produce 91 percent of the total output of the country, the balance being produced in the West. The statement shows that mines which have the best natural conditions, thickest coal, and which are located closest to markets have lost their business to inferior mines further from markets, due to abnormal labor adjustments. In the 10 states named there are 5,048 mines. He states that it is not practical or economical to store bituminous in greater quantities than is now being practiced, as storage is more expensive than the service is worth, costing 50 cents per ton.

Mr. Beck stated that a goal which bituminous mining can achieve is production for 250 days per year at the rate of four days per week for six months, and full time operation for six months. He says the potential capacity of the bituminous mines of the country is less than 20 percent above the actual demand for coal. Mr. Beck states that the alleged over-production of coal is less than that of many other lines of industry.

EXPLOSIBILITY OF VARIOUS COALS STUDIED BY BUREAU OF MINES

During the past 15 years the Bureau of Mines, at its experimental mine near Pittsburgh, Pa., has tested mine-sized dust prepared from coal taken from 29 different mines in different parts of the country. These range in composition from the anthracites of eastern Pennsylvania to the high volatile coals of Utah and Wyoming. The amount of incombustible material required in a mixture to prevent propagation of an explosion under standard propagation test conditions was determined for each coal. It was found that 20 percent was sufficient for a coal whose ratio of volatile to total combustible was 0.15, but the quantity increased rapidly with increasing ratio and 61 percent was required with coals whose ratio was 0.23. There was then no further increase until ratio 0.40 was passed; that is, a coal having a ratio of 0.40 required 61 percent incombustible in the mixture the same as a coal of ratio 0.23. Beyond ratio 0.40 there was a slow increase, and 70 percent incombustible was required for coals whose ratio was 0.50. It is felt that these limits are known with sufficient accuracy to justify applying them to any coal not tested in the experimental mine. Composition is one of six factors which influence the explosibility of coal dust and a paper summarizing the present knowledge of all six is in preparation for publication by the bureau.

EFFECT OF STEMMING ON THE EFFICIENCY OF EXPLOSIVES

In view of certain instances of a remarkable increase in the efficiency of explosives due to the use of stemming, which have come to the attention of the United States Bureau of Mines, a new edition of Technical Paper 17, dealing with this subject, has been issued, containing the details of these instances.

One company reports that, with the use of stemming, a test has shown a saving in powder consumption of approximately 20 percent. Another company reports that the result of a three months' test in the stopes showed a saving in the consumption of explosives amounting to almost 25 percent. The full benefit of "stemming" will only be obtained if systematically enforced throughout a mine. It is necessary to provide plenty of suitable material at some convenient point, so that there is no excuse for not using it. This, however, is not all; intelligent and interested supervision is necessary to insure its general use and to overcome the passive resistance that many men offer to all innovations.

Copies of Technical Paper 17, "The Effect of Stemming on the Efficiency of Explosives," may be obtained from the United States Bureau of Mines, Department of Commerce, Washington, D. C.

SPONTANEOUS HEATING OF COAL IN STORAGE

A general review of the results of chemical and physical research relative to the causes and prevention of the spontaneous heating of coal in storage has been published by the Bureau of Mines as Technical Paper 409.

All coals but anthracite undergo some spontaneous heating, state Joseph D. Davis and D. A. Reynolds, the authors. The liability to self-heating is greatest among coals of lowest rank. One must therefore use greater care in storing a sub-bituminous coal than in storing a high-rank bituminous coking coal. More pains should be taken to prevent segregation of fine coal in the storage pile, and foreign matter should be excluded more carefully.

Oxidation of the coal substance itself is the main cause of spontaneous combustion; some of the organic constituents may contribute more to the heating than others, but it has not been shown that any one constituent exerts a preponderant influence to the exclusion of the rest.

The process of spontaneous heating may be considered to take place in two stages. The first stage is operative at room temperature as soon as freshly broken coal is exposed to the air. It begins with the physical absorption of oxygen and is continued by the formation of a solid chemical compound of coal and oxygen, which is gradually decomposed as the temperature rises. Decomposition is not complete, however, until the temperature reaches about 445 degrees F. This first stage of the process generates heat, but not as much as the second stage. The coal increases in weight by the amount of oxygen retained.

The second stage involves the breaking up of the solid compound of coal with oxygen and the formation of the final oxidation products—carbon dioxide, carbon monoxide, and water. With the Appalachian coals this stage begins to be appreciable at about 85 degrees F. and increases in intensity as the temperature rises. With lower-rank coals the beginning temperature is lower. Both stages of the process go on simultaneously, therefore, from about 85 to 445 degrees F. There is no sharp transition from one stage to the other; the curve showing the relation between duration of heating and temperature is continuous. The rate of heating increases logarithmically with the temperature; that is, no coal has as an inherent property a critical temperature at which there is a sharp transition from relatively slow to rapid heating. When the term "critical temperature" is used, it should be clearly defined as the temperature at which the rate of generation of heat becomes greater than its rate of dissipation under certain fixed conditions. For other conditions this critical temperature will be different.

Opinions differ as to what effect moisture in coal has on spontaneous heating. Probably the effect of moisture is determined by the conditions of storage. If one could be sure of wetting only those parts of the storage pile where spontaneous heating would otherwise develop, he could very probably prevent it; the heat required to vaporize the water would be more than the oxidizing coal could supply. However, wetting down the surface of the whole pile changes the conditions of ventilation and may favor heating at points not reached by the water, where dangerous heating would not otherwise occur.

Chemical factors other than those touched upon above have little or no influence on the spontaneous heating of coal.

Laboratory studies have indicated what kinds of coal heat the most readily, and their relative tendencies to heat can be measured by several methods. The effect of fine coal, pyrites, etc., has also been shown. The fact remains, however, that all bituminous coals have heated in storage when conditions were favorable. It is believed, therefore, that the most fruitful studies of the future will deal with storage conditions. Work is particularly needed on the effect of air supply. For example, how should coal be stored to make sure that all parts of the storage pile will lack just enough air to support oxidation or shall have sufficient air circulation to carry off the heat generated?

Copies of Bureau of Mines Technical Paper 409, "Spontaneous Heating of Coal," may be obtained from the Superintendent of Documents, at a price of 20 cents.

Volume one of the proceedings of the Rocky Mountain Coal Mining Institute for 1928 has recently been issued. The book is larger and more complete than the issues of any previous year.

Output per man in the blast furnaces of the United States increased from 25 tons in 1850 to 1,257 tons in 1925, the Bureau of Labor Statistics discloses. During these 75 years the number of employes increased only 44 percent, while the output increased more than 7,000 percent.

WITH THE MANUFACTURERS

New Portable Mine Car Air Compressor

A new low vein portable mine car air compressor has been brought out by the Sullivan Machinery Company, Chicago, and is described in their bulletin entitled "Sullivan Mine Car Air Compressor." The machine is intended for use in coal mines where the height of the machine precludes the use of larger, that is, higher machines. The machine was on display for the first time at the Cambria County Industrial Exposition at Ebensburg, Pa., the week of July 22. Two of its interesting features are (1) either chain or rope feed, as desired, and (2) in the direct current type, the use of remote control apparatus outside the body of the machine.

Many years of experience in the design and construction of mining machinery of various types for use in cramped conditions have been drawn upon by the Sullivan engineers in working out the general plan and design of the compressor. Its uses include underground rock drilling of all sorts; in tunneling, in sinking, in taking up bottom in entries or gangways, in trimming walls, in brushing top, in cutting overcasts, etc.; for operating mine pumps in isolated parts of the property; and in rock dusting mines.

Reorganization Effected By Joy Manufacturing Company

It is announced by the Joy Manufacturing Company that at a meeting in Franklin, Pa., on July 26, the Creditors' Committee, directing the company's affairs since 1925, was dissolved and a new Board of Directors elected.

In approximately three years an indebtedness of nearly $500,000 has been paid, in addition to providing sufficient working capital and inventory to place the company in excellent financial condition.

Mr. John A. Donaldson, president; Wm. E. Barrow, vice president and secretary, and Walter M. Dake, consulting engineer in charge of sales, will continue in these capacities.

The Economy Rock Breaker and Granulator is announced in an advance bulletin by the Economy Equipment Co., 644 I. W. Hellman Building, Los Angeles, Calif. Copy of the bulletin will be sent upon request to the company at the above address.

Primary-Resistance Drum Switches

The General Electric Co. has announced a new line of primary-resistance drum switches for use with squirrel-cage induction motors on small cranes, hoists, machine tools, etc. This switch bears the designation CR-3200-1250.

It is a primary reversing switch, and the capacity is rated in horsepower. It is designed for wall mounting and can be furnished with a standard conduit box. It is made in two forms: CR-3200-1250-B for hoists where the motor is overhauled in the lowering direction, and CR-3200-1250-A for hoists where the motor is not overhauled in the lowering direction. An example of the former is a hoist with spur gearing and no automatic mechanical load brake. An example of the latter is a hoist using low-efficiency worm gearing or an automatic mechanical load brake. The CR-3200-1250-B provides four points hoisting and one point lowering. The CR-3200-1250-A provides four points forward and four points reversing. The latter is designed for use with machine tools or general-purpose applications.

The switches are built without operating mechanism, so that the user may select the type of operating equipment he desires. The dial plate for the horizontal handle is assmbled with the drum switch and it is removed and discarded when the vertical handle or rope wheel attachment is to be used. This change in operating mechanism involves only the removing and replacing of four screws from the dial plate.

The switches are designed for operation on maximum primary voltages of 550, and the maximum horsepower rating for 2- or 3-phase service is 15.

The Clarkson Flexible Rail

The Illinois Power Shovel Company, of Nashville, Ill., have developed the "Clarkson Flexible Rail," to be used in conjunction with the National Conway coal shovel, which is a track-mounted machine to reach out and clean up a wide place, such as a coal mine room.

The Clarkson flexible rail is composed of small cast steel sections with stop ears attached. The rail sections rest in chairs or saddles that are mounted on cross ties. The construction of this most sturdy and dependable rail is so arranged that, when the straight track is moved from one side to the other, the inside rail sections contract and the outside rail sections let out, forming a uniform curve.

By utilizing 24 in. of the Clarkson rail and a section of track 20 ft. long, one is able to realize 8½ ft. on each side of center of the straight track. If a greater swing is desired, it is only necessary to add a few more sections of the flexible rail.

The rail can be easily attached to permanent track by using only one-half of the saddle with combination fish plates, cast into the saddle. The two saddles and fish plates are bolted to a cross tie, which hold the flexible rail to the permanent track.

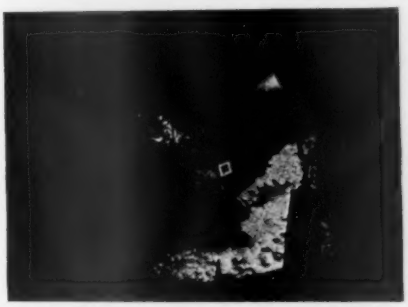
In order to take the flexible rail sections apart, all that is required is to raise the cross ties to a 45 degree position as shown in the illustration.

Study Effect of Acetylene Flood Lights on Mine Air

In order to determine the effect of the operation of acetylene flood lights in the metal mines, an investigation has just been completed by the Union Carbide & Carbon Research Laboratories, Inc., for the Oxweld Acetylene Company, distributors of the well-known carbic light. The investigation was conducted by Mr. E. K. Judd, of the former organization.

Using the Standard Style No. 2 Carbic Light, it was determined that burning at a normal rate 3.332 cu. ft. of acetylene would be generated per hour and in the combustion of this 8.33 cu. ft. of oxygen from the atmosphere was consumed. This would indicate the requirement of 39.7 cu. ft. of air to complete the combustion and that 6.66 cu. ft. of carbon dioxide would be produced. Following the matter still further, it was determined that the amount of ventilation required to avoid reducing the oxygen content of the atmosphere in the mine below 17 percent, would be 208.2 cu. ft. per hour; and the ventilation required to avoid accumulation of over 2 percent carbon dioxide, would be 336 cu. ft. per hour.

The depletion of oxygen, especially in the presence of increasing percentages of carbon dioxide is more likely to prove



undesirable than an excess of carbon dioxide in an atmosphere approximately normal with regard to percentage of oxygen. It is obvious, however, that if sufficient ventilation is provided to maintain the carbon dioxide content at 2 percent or less, no anxiety need be felt as to a deficiency of oxygen.

Translated into terms of the air capacity of the average metal mine stope, these figures indicate that even with only natural ventilation there is so great an excess of air available that the effect of oxygen consumption of acetylene flood lights is practically negligible. Expressed in another way, the oxygen consumed by a carbic light and the proportionate carbon dioxide produced is slightly less per hour than the effect on the atmosphere produced by the respiration of three men.

New Slide-Rail Holder and Turn

A new track invention in the form of a slide-rail holder or cuff, and a slide-rail turn has just been announced by its inventor, J. E. Wilson, of Eldora, Ill.

With the holder or cuff, two slide rails can be connected without the use of fish plates or bolts. The slide rail turn is installed without the use of ties, spikes, bolts, nuts or pins. It can be layed and put into operation in 10 minutes, whereas the old way takes several hours to lay a turn. This turn can also be used as a switch.

The turn when used in connection with a pit car loader or a short wall loader in a test made recently, showed that two to three cars could be loaded at a time, which greatly reduced the switching time per car as well as speeding up loading time to some extent. Mr. Wilson, in quoting a mine superintendent where these turns are installed, states, "The turn was easily and quickly layed causing practically no delay to the machine. Where turns are layed to load out crosscuts, the use of this device will prove a big saving in labor and material cost."

An interesting article recently appeared in the Pittsburgh *Sun-Telegraph*, reviewing the history and purpose of the Mine Safety Appliances Company. We quote below part of the article:

"The enterprise and ingenuity of two Pittsburgh men has saved thousands of lives during the past 14 years. They have built up a business which is not duplicated anywhere else in the country. They both believe that they have barely started on their work of eliminating accidents.

"The two men are George H. Deike, president of the Mine Safety Appliances Company, and John T. Ryan, vice president and general manager. Both of them, before starting their present business, were connected with the rescue division of the United States Bureau of Mines. In their work of penetrating the gaseous depths of mines, swept by disaster, they saw catastrophe after catastrophe which might have been averted. * * *"

The article tells how they started out as the distributors of the Edison safety cap lamps, and gradually expanded, manufacturing devices of their own perfection, and adopting other safety devices as they developed, such as the gas mask.

In concluding, the article states, "Employes of the Mine Safety Appliances Company are found at every mine disaster. They give their services and the use of their equipment. No charge is ever made for such emergency work."

Sand Flotation Cleaning Process

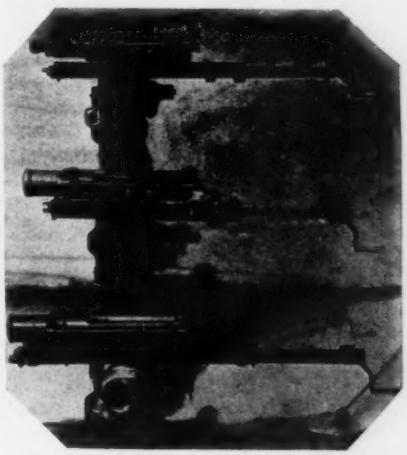
H. M. Chance & Company, Philadelphia, have just issued a booklet entitled "Stabilization of the Coal Industry and the Sand Flotation Process," by H. M. Chance. It has been so written that those without technical familiarity with the theories covering the operation of coal washing appliances may readily understand the differences in principle which it is the object of the pamphlet to make plain. Copies will be sent on request.

New Drifter Drills

The Ingersoll-Rand Company, of 11 Broadway, New York City, recently announced a new line of drills of the drifter type. These drills, three in number, are all of the same general construction, differing only in size.

These new drills emphasize simplicity of construction with streamlines and a pleasing appearance. Greater drilling speed, higher efficiencies, and easier handling are some of the features claimed by the manufacturer.

The largest of these drifters, the S-70, weighs 185 pounds. It is recommended for heavy duty in hard rock and for deep holes. It is especially suited for tunnel work, large mine headings, and in both dimension and crushed stone quarries.



The 138-pound N-75 machine fulfills the needs of the general run of work around the mine. Its power and speed enables it to do the work that formerly required machines from 20 to 40 pounds heavier.

The L-74 is a real, one-man drill. It weighs 110 pounds, yet it is powerful. It is recommended for medium soft ground, for close-quarter working or where light weight is essential.

Details of the new drills were broadcasted to mining men in all parts of the world by means of an attractive, four-page, two-color flier. Copies of this folder can be secured from the nearest Ingersoll-Rand branch.

Copperweld Wire Now Used for Fence

After an extended period of actual test service, laboratory experimentation and field research, copperweld wire is now to be used as a material for residential, industrial and institutional fences, according to a recent announcement issued by the Copperweld Steel Company of Glassport, Pa. This new type of fence, which is to be had in both "ornamental" and "chain link" constructions, is to be distributed through the Page Fence Association of Chicago.

In copperweld fence a thick layer of ductile copper is molten welded to a steel core. This is done by heating a steel billet to a welding, white-hot heat, after which it is surrounded with a layer of molten copper.

Several features are claimed for this type of wire. For instance, it is asserted that the welded copper exterior affords almost indefinite life to the wire by reason of its rust-resisting qualities. Permanence is a most desirable feature in fence, particularly in industrial districts where the atmosphere is laden with corrosive elements. Another interesting point made for this wire is that it can be colored to any desired shade of green, or brown, merely through the application of acids. The possibility of tinting a permanent fence lends esthetic value to an otherwise ordinary product that would appeal to many property owners.

New Crane Panels Take Less Room in Cab

The General Electric Co. announces the revision of its line of crane protective panels bearing the designation CR-7409. Such panels provide overload and undervoltage protection for all the motors of a crane and are designed to be used with an emergency switch for use by the operator in an emergency. They may be used with either drum switches or magnetic control panels.

The principal change in the revised line is a regrouping of the units involved, resulting in a decided reduction in total size. This is considered a distinct advantage, as the space in most crane cabs is very limited. Another change is the substitution of instantaneous overload relays instead of dashpot overload relays. Otherwise the equipment is practically the same as before, except that up-to-date material is used in all cases.

The Magnetic Manufacturing Company announces a discontinuance of their former sales office and the opening of a direct factory branch office at 211 North Desplaines Street, Chicago, where all business for Chicago and the vicinity pertaining to magnetic equipment problems will be handled in the future.

"Everything In Safety"

"Everything In Safety" is the title of a 106-page bulletin recently issued by the E. D. Bullard Company, of Salt Lake City. Besides illustrating and describing their products which cover *everything for safety*, there is an index in the front of the book in which the reader can locate practically any type or kind of safety equipment he may be interested in. Copies of the bulletin (No. 28) may be procured from the company's Salt Lake, San Francisco, or Los Angeles offices.

Oxweld Acetylene Bulletins

The Oxweld Acetylene Company, New York City, has issued bulletins recently describing their carbic flood lights which are becoming so popular in metal mines and other industrial uses: Oxwelding and cutting equipment (a 55-page illustrated pamphlet), and another describing the Carbic low-pressure acetylene generator.

"Oxwelded Industrial Piping" is the title of a bulletin just issued by the Linde Air Products Company, New York City. It describes and explains clearly economies in construction, repair and maintenance of oxwelded pipe systems and is profusely illustrated. Copies may be obtained from the company at 30 East 42d Street, New York City.

The June issue of the "Explosives Service Bulletin," published by the E. I. du Pont de Nemours & Company, is devoted to a discussion by H. H. Hamilton, technical representative of the company, concerning the handling of misfires, a phase of blasting operations which deserves much more attention than it usually receives.

The following are among the recent bulletins of the General Electric Company: Arc Welding In Industry; Arc Welding in G-E Factories; Arc Welder, belt, motor or gas engine drive, stationary or portable; Direct-heat Electric Furnaces; Direct-Current Crane and Hoist Motors; Squirrel Cage Induction Motors (riveted frame); Mill Motors (d. c.); Sheath-Wire Resistor Units for Cable Reel Motors.

The Fusion Welding Company, Chicago, has issued two bulletins, one entitled "The Influence of Carbon in Steel Welding Rods" (Bulletin 128), and the other describing their line of welding machines. Bulletin 128 is the first of a series which they plan to distribute every four to six weeks, each one dealing with some particular welding question. The company will be glad to furnish copies upon request.

Announcement is made of the appointment of Hans J. Meyer as an engineer of the Foreign Department of International Combustion Engineering Corporation. He will sail on the 6th of June for the Far East. During the war Mr. Meyer was appointed Administrative Engineer, U. S. Fuel Administration, Bureau of Conservation, in which office he served with distinction. He became identified with the Combustion Engineering Corporation in 1926.

Officers of the Columbus McKinnon Chain Company, Tonawanda, N. Y., have recently announced the purchase by that company of the chain block electric hoist and crane division of the Chisholm & Moore Manufacturing Co., of Cleveland.

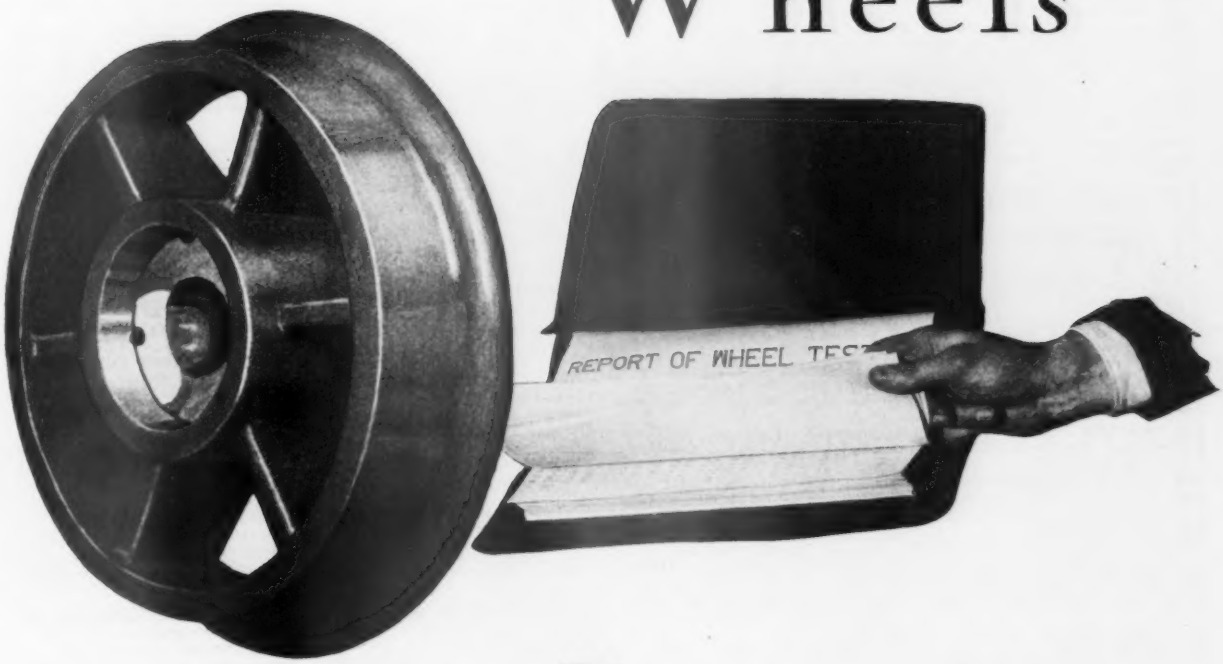
Sam H. Moore, president and founder of the Chisholm & Moore Manufacturing Co., will continue to be active and the personnel of this company will remain unchanged. The sales offices and plant will remain in Cleveland, and will be operated as the Chisholm-Moore Hoist Co., a division of the Columbus McKinnon Chain Co.

The Magnetic Mfg. Co. has appointed Mr. J. H. Phinney as exclusive representative for the eastern part of Michigan, with headquarters in the U. S. Mortgage Bldg., at Detroit, on its complete line of magnetic separation equipment and magnetic clutches, for power transmission, etc.

FELDSPAR IN 1927

THE crude feldspar sold or used by producers in the United States in 1927 amounted to about 202,497 long tons, valued at $1,424,755, or $7.04 a ton, according to reports obtained from producers by the Bureau of Mines in cooperation with the geological surveys of Maryland, New York, North Carolina, and Virginia. These figures show a decrease of 4 percent in quantity and 11 percent in total value compared with 1926. Feldspar was mined and sold in 1927 in 12 states, namely, Arizona, California, Colorado, Connecticut, Maine, Maryland, New Hampshire, New York, North Carolina, Pennsylvania, South Dakota, and Virginia. The greatest feldspar-producing region is that which includes the Atlantic seaboard states, from Maine to North Carolina. This region reported about 94 percent of the total production and value in 1927. North Carolina, the leading state, reported about 50 percent of the total output; Maine, the second state, reported nearly 17 percent; and New Hampshire, the third state, nearly 14 percent. The average value per long ton in North Carolina was $6.08; in Maine, $8.72; and in New Hampshire, $8.13.

Pedigreed Wheels



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ACETYLENE GAS
Prest-O-Lite Co., Inc., 30 E. 42d St., New York City.

ACETYLENE GENERATING APPARATUS
Oxweld Acetylene Co., 30 E. 42d St., New York City.

ACID, SULPHURIC
Irvington Smelting & Refining Works, Irvington, N. J.

AERIAL TRAMWAYS
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AFTERCOOLERS (Air)
Ingersoll-Rand Co., New York City.

AIR COMPRESSORS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Sullivan Machinery Co., 122 S. Mich. Ave., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York City.

AIR COMPRESSOR OILS
Standard Oil Co. (Ind.), Chicago, Ill.

AIR FILTERS—Bag type
American Coal Cleaning Corpn., Welch, W. Va.

AIR HEATERS
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

AIR HOSE COUPLINGS
Knox Mfg. Co., 811-821 Cherry St., Philadelphia, Pa.

AIR LIFT PUMPING
Sullivan Machinery Co., 122 S. Mich. Ave., Chicago, Ill.

ALL SERVICE GAS MASKS
Mine Safety Appliances Co., Braddock Ave. and Thomas Blvd., Pittsburgh, Pa.

ANEMOMETERS
Mine Safety Appliances Co., Braddock Ave. and Thomas Blvd., Pittsburgh, Pa.

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John A. Roebling's Sons Co., Trenton, N. J.

ANNUNCIATOR WIRES & CABLES, INSULATED
American Steel & Wire Co., Chicago, Ill., and New York.

ANTI-RUST OILS & GREASES
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ARMATURE COILS & LEADS
General Electric Co., Schenectady, N. Y.
John A. Roebling's Sons Co., Trenton, N. J.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

ARMORGRIDS
Hendrick Mfg. Co., Carbondale, Pa.
General Electric Co., Schenectady, N. Y.

ASPIRATORS
American Coal Cleaning Corpn., Welch, W. Va.

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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mining Safety Device Co., Bowerston, Ohio.

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Connellsville Mfg. & Mine Supply Co., Connellsville, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Roberts & Schaefer Co., Chicago, Ill.

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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Roberts & Schaefer Co., Chicago, Ill.

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American Mine Door Co., Canton, Ohio.

AUTOMATIC (Mine Doors, Trucks and Electric Switches)
American Mine Door Co., Canton, Ohio.

AUTOMATIC MINE SWITCHES
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

AUTOMATIC SWITCH THROWERS
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Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

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BALL BEARINGS
S K F Industries, 40 E. 34th St., New York City.

BALL & ROLLER BEARINGS
S K F Industries, 40 E. 34th St., New York City.

BARS, STEEL
Carnegie Steel Co., Pittsburgh, Pa.
Timken Roller Bearing Co., Canton, Ohio.

BATTERIES, Armature
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

BATTERIES, Blasting
Hercules Powder Co., Wilmington, Del.

BATTERIES, DRY (for Bells, Buzzers, Signals, Blasting)
National Carbon Co., Inc., 30 East 42nd St., New York City.

BATTERIES (Storage, Gas Welding, Cutting, Dissolved Acetylene)
Prest-O-Lite Co., 30 East 42d St., New York City.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

BEARINGS
S K F Industries, 40 E. 34th St., New York City.

BEARINGS (for all kinds of equipment)
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S K F Industries, New York City.

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S K F Industries, New York City.

BEARINGS, ROLLER
S K F Industries, New York City.

BEARINGS, SHAFT, SELF-OILING
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BEARINGS, TAPERED ROLLER
Timken Roller Bearing Co., Canton, Ohio.

BEARINGS, THRUST
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John A. Roebling's Sons Co., Trenton, N. J.

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Standard Oil Co. (Ind.), Chicago, Ill.

BELTING (Conveyor, Elevator, Transmission)
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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

BELTING, SILENT CHAIN
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.

BELTS, Miners' Safety
Mine Safety Appliances Co., Braddock Ave. and Thomas Blvd., Pittsburgh, Pa.

BINS (Coke and Coal)
The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

BIT BOXES
Mine Safety Appliances Co., Braddock Ave. and Thomas Blvd., Pittsburgh, Pa.

BITS, Carbon (Diamonds) for Core Drill
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Diamond Drill Carbon Co., World Bldg., New York.

BITS, Diamond Drilling
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BIT SHARPENERS
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Ingersoll-Rand Co., 11 Broadway, New York City.

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R. S. Patrick, Sellwood Building, Duluth, Minn.

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BLASTING CAPS
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Mine Safety Appliances Co., Braddock Ave. and Thomas Blvd., Pittsburgh, Pa.

BLASTING MACHINES
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Hercules Powder Co., 934 King St., Wilmington, Del.

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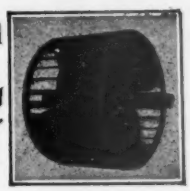

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ECONOMY

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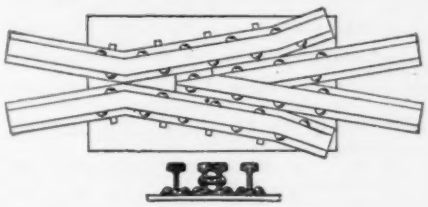

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CAGES (Safety Appliances)
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Mining Safety Device Co., Bowerston, Ohio.
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Mining Safety Device Co., Bowerston, Ohio.
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Diamond Machine Co., Monongahela, Pa.
Link-Belt Co., 300 W. Pershing Rd. Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.

CAGES, (Self-dumping)
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Roberts & Schaefer Co., Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.

CALCINERS
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R. S. Patrick, Sellwood Building, Duluth, Minn.

CARBON FOR DIAMOND DRILLING
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R. S. Patrick, Sellwood Building, Duluth, Minn.

CARBON BURNING APPARATUS
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CARBON ELECTRODES (for Electric Furnaces and Electrolytic Work)
National Carbon Co., Inc., Electrode Sales Division, 30 East 42nd St., New York City.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

CARBON MONOXIDE DETECTOR
Mine Safety Appliances Co., Braddock Ave. and Thomas Blvd., Pittsburgh, Pa.

CARBONS (for Arc Lamps, Blue Printing, Photographic)
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CARBON RODS AND PASTE FOR WELDING
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National Carbon Co., Inc., Cleveland, Ohio and San Francisco, Calif.

CARBON SPECIALTIES (Circuit Breaker Contacts, Packing Rings, Filter Plates, Tubes, etc.)
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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mining Safety Device Co., Bowerston, Ohio.
Phillips Mine & Mill Supply Co., Pittsburgh, Pa.
Roberts & Schaefer Co., Chicago, Ill.

CAR DUMPERS (Rotary)
Connellsville Mfg. & Mine Supply Co., Connellsville, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mining Safety Device Co., Bowerston, Ohio.
Phillips Mine & Mill Supply Co., Pittsburgh, Pa.
Roberts & Schaefer Co., Chicago, Ill.

CAR FEEDERS
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mining Safety Device Co., Bowerston, Ohio.
Roberts & Schaefer Co., Chicago, Ill.

CAR HAULS
Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.
Hockensmith Wheel & Mine Car Co., Penn, Pa.
The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Roberts & Schaefer Co., Chicago, Ill.

CARNOTITE ORES
O. Barlow Willmarth, Georgetown, Colo.

CAR PULLERS
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S. Flory Mfg. Co., Bangor, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Roberts & Schaefer Co., Chicago, Ill.

CAR RETARDERS
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mining Safety Device Co., Bowerston, Ohio.
Roberts & Schaefer Co., Chicago, Ill.

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American Car & Foundry Co., 30 Church St., New York City.
Hockensmith Wheel & Mine Car Co., Penn, Pa.

CAR STOPS, AUTOMATIC & MANUAL
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Phillips Mine & Mill Supply Co., Pittsburgh, Pa.
Roberts & Schaefer Co., Chicago, Ill.

CAR WIRE & CABLES
American Steel & Wire Co., Chicago, Ill., and New York.
John A. Roebling's Sons Co., Trenton, N. J.

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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.
Timken Roller Bearing Co., Canton, Ohio.

CASTINGS, GRAY IRON
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.

CASTINGS, OPEN HEARTH STEEL
Vulcan Iron Works, Wilkes-Barre, Pa.

CASTINGS (steel, iron)
Vulcan Iron Works, Wilkes-Barre, Pa.

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Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.
The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.

CHAINS, AUTOMOBILE ENGINE
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.

CHAINS, COAL CUTTING
Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.
The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

CHAINS, DRIVE
Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.
The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.

CHAINS, FRONT END
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.

CHAIN LUBRICANTS
Standard Oil Co. (Ind.), Chicago, Ill.

CHAINS, OILING
Morse Chain Co., Ithaca, N. Y.

CHAINS, POWER TRANSMISSION
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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.

CHAINS, Silent (Bushed-Pin Joint)
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CHAINS, SILENT (Rocker-Joint)
Morse Chain Co., Ithaca, N. Y.

CHAINS, SLING
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.

CHAINS, SPROCKET WHEEL
Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.
The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.
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Morse Chain Co., Ithaca, N. Y.

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Central Frog & Switch Co., Cincinnati, Ohio.

CLAMPS, HOSE
Knox Mfg. Co., Philadelphia, Pa.

CLAMPS (Mine)
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

CLAMPS (Trolley)
General Electric Co., Schenectady, N. Y.
Ohio Brass Co., Mansfield, Ohio.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

CLAMPS, WIRE ROPE
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John A. Roebling's Sons Co., Trenton, N. J.

CLIPS, WIRE ROPE
American Steel & Wire Co., Chicago, Ill., and New York.
John A. Roebling's Sons Co., Trenton, N. J.

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Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.
The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

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American Coal Cleaning Corpn., Welch, W. Va.
American Rheolaveur Corporation, Wilkes-Barre, Pa.
G. R. Delamater, 3233 Chadbourne Road, Cleveland, Ohio.
The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Roberts & Schaefer Co., Chicago, Ill.

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Thorne, Neale & Co., Philadelphia, Pa.

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Conveyor Sales Co., 299 Broadway New York City.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

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The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COAL CRUSHERS & ROLLS
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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.

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Ingersoll-Rand Co., 11 Broadway, New York City.
The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.
Sullivan Machinery Co., 122 S. Mich. Ave., Chicago, Ill.

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Conveyor Sales Co., 299 Broadway New York City.
Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.
The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.
Joy Manufacturing Co., Franklin, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mining Safety Device Co., Bowerston, Ohio.
Roberts & Schaefer Co., Chicago, Ill.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

COAL LOADERS
The Conover Co., Columbus, Ohio.
Conveyor Sales Co., 299 Broadway, New York City.
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The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.
Joy Manufacturing Co., Franklin, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COAL MINING MACHINERY
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Ingersoll-Rand Co., 11 Broadway, New York City.
The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Sullivan Machinery Co., 122 S. Mich. Ave., Chicago, Ill.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

COAL MINING PLANTS
American Coal Cleaning Corpn., Welch, W. Va.
Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York City.
The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Roberts & Schaefer Co., Wrigley Bldg., Chicago, Ill.

COAL PREPARATION MACHINERY
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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Roberts & Schaefer Co., Chicago, Ill.

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Roberts & Schaefer Co., Chicago, Ill.

COAL SEPARATORS (Spiralizers)
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COAL TESTING EQUIPMENT
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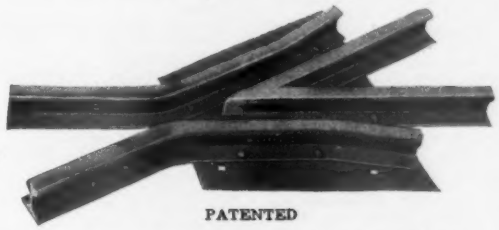

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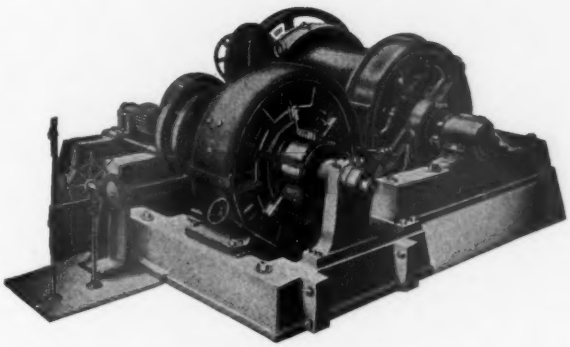

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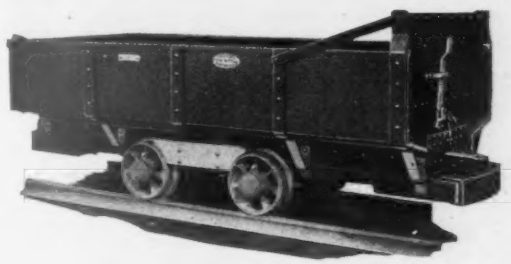

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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

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COOLERS, ROTARY
Vulcan Iron Works, Wilkes-Barre, Pa.

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Pennsylvania Drilling Co., Pittsburgh, Pa.

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CROSSOVERS
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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.

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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

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Standard Oil Co. (Ind.), Chicago, Ill.

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DECARBONIZING APPARATUS
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American Rheolaveur Corporation, Wilkes-Barre, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Roberts & Schaefer Co., Chicago, Ill.

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Sullivan Machinery Co., 122 S. Mich. Ave., Chicago, Ill.

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R. S. Patrick, Sellwood Building, Duluth, Minn.

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R. S. Patrick, Sellwood Building, Duluth, Minn.

DIAMONDS, INDUSTRIAL
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R. S. Patrick, Sellwood Building, Duluth, Minn.

DIAMOND TOOLS
Diamond Drill Carbon Co., World Bldg., New York.

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DOWNIE DEEP WELL PUMPS
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DRIFTERS, DRILL
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DRILLING CONTRACTORS
Pennsylvania Drilling Co., Pittsburgh, Pa.

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R. S. Patrick, Sellwood Building, Duluth, Minn.

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Ingersoll-Rand Co., 11 Broadway, New York City.
Keystone Churn Drill Co., Beaver Falls, Pa.

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Sullivan Machinery Co., 122 S. Mich. Ave., Chicago, Ill.

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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.

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Vulcan Iron Works, Wilkes-Barre, Pa.

DRY CLEANING COAL & COKE
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Link-Belt Co., 300 W. Pershing Rd. Chicago, Ill.
Roberts & Schaefer Co., Chicago, Ill.

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Roberts & Schaefer Co., Chicago, Ill.
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DUST FILTERS
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Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

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Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

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Link-Belt Co., 300 W. Pershing Rd. Chicago, Ill.

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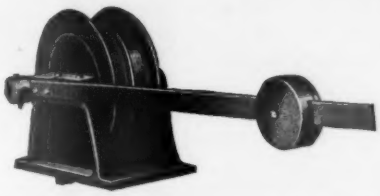

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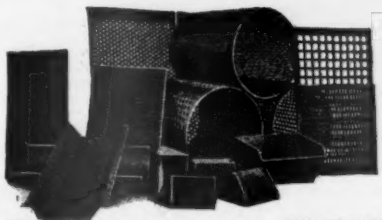

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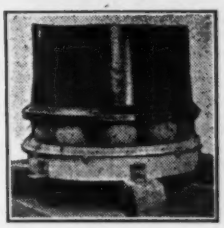

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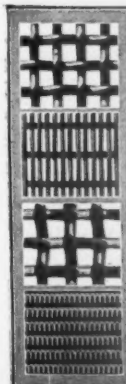

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Underground Ventilation
Diesel Engines for Power
Use and Care of Rock Drills
Underground Haulage
Mining Methods
Central Power Plants
Hoisting Methods
Scrapers for Underground Loading
Mine Shafts
Purchasing Policies
Treatment of Oxidized Ores
Other Mining, Milling and Smelting Problems

These are some of the topics chosen for discussion at the annual meeting of the Western Division of The American Mining Congress, Los Angeles, September 10-13. Those leading the discussions will come from many of the largest mining enterprises and districts of the country.

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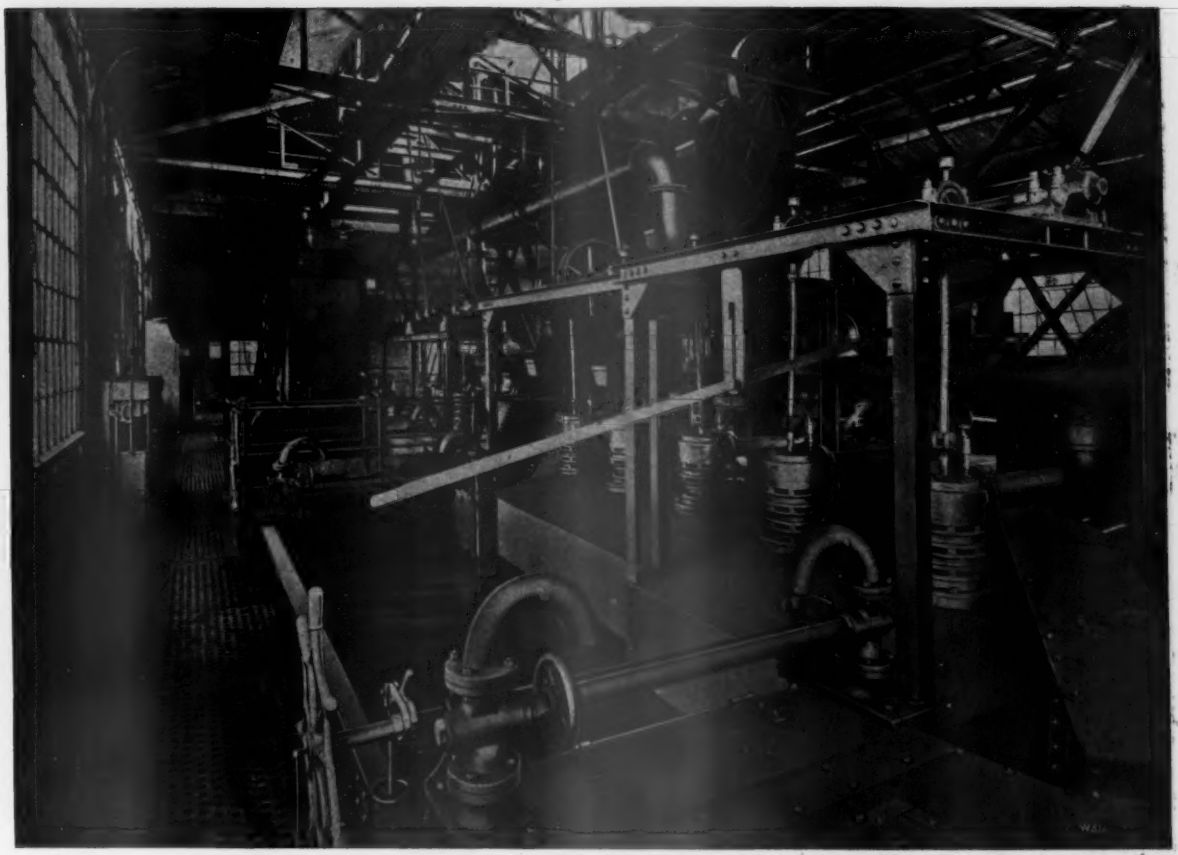

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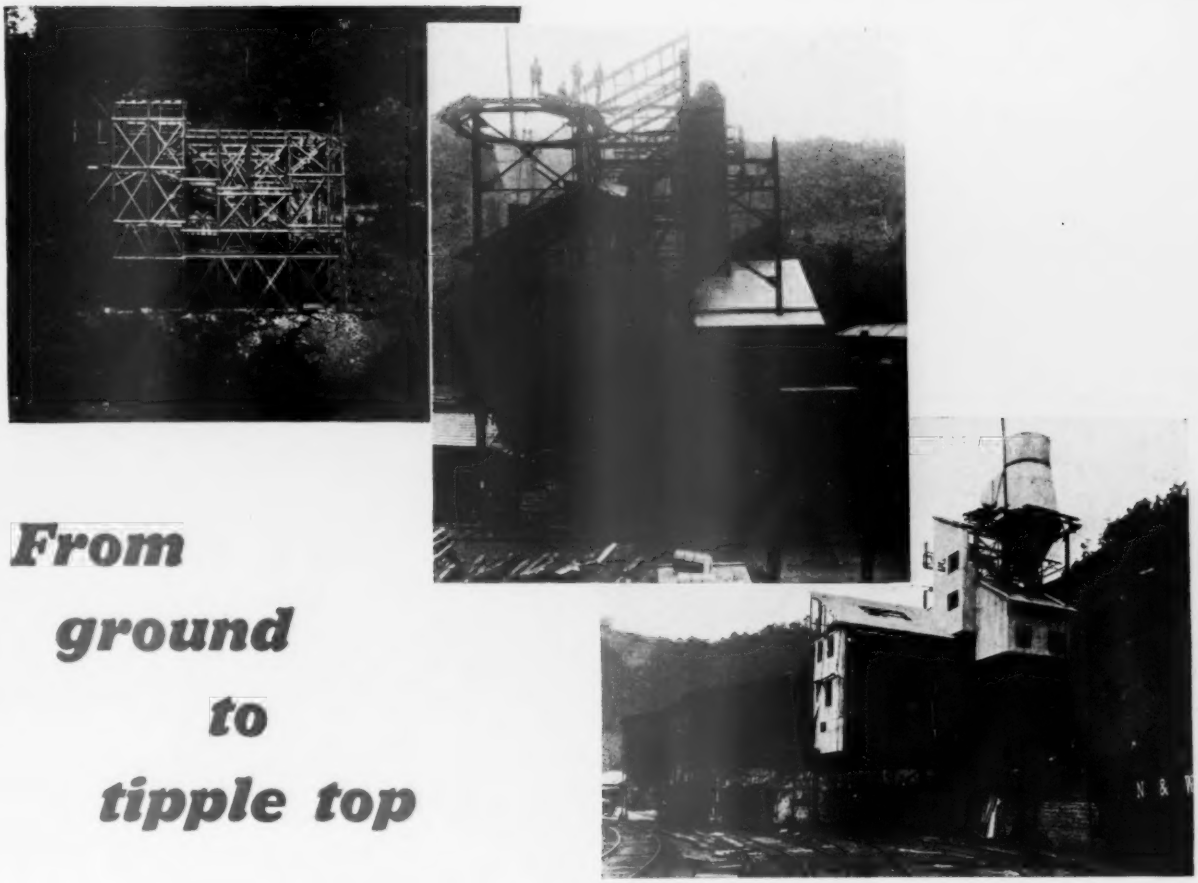

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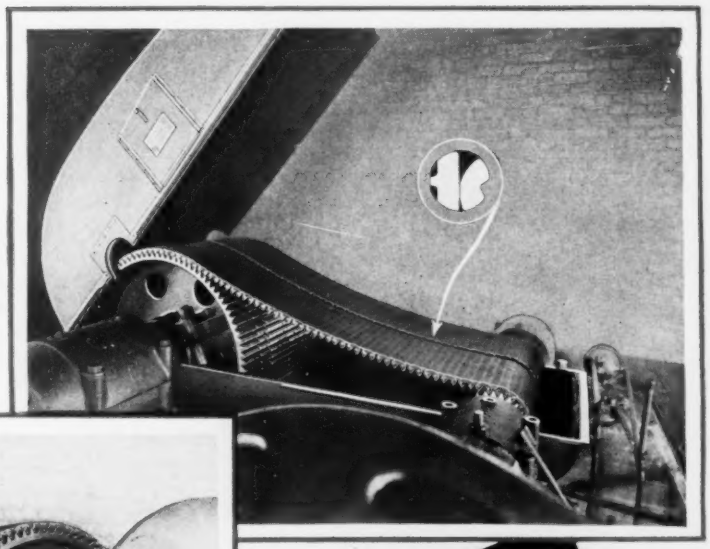

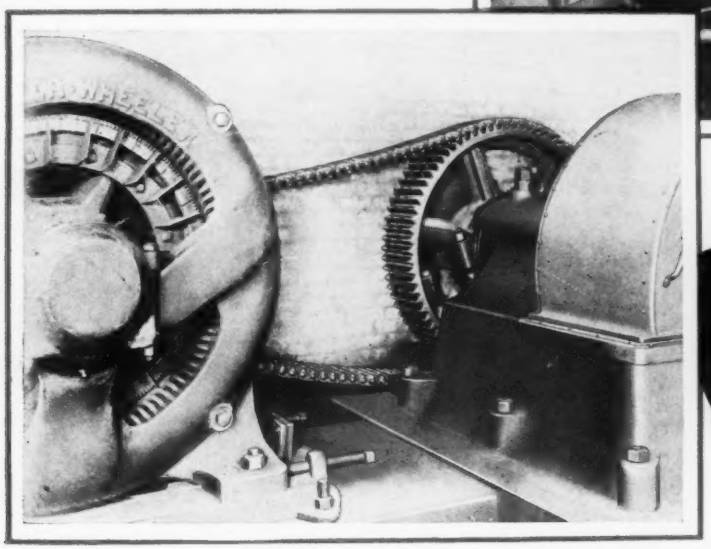

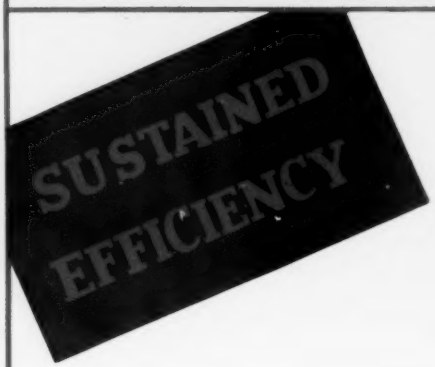

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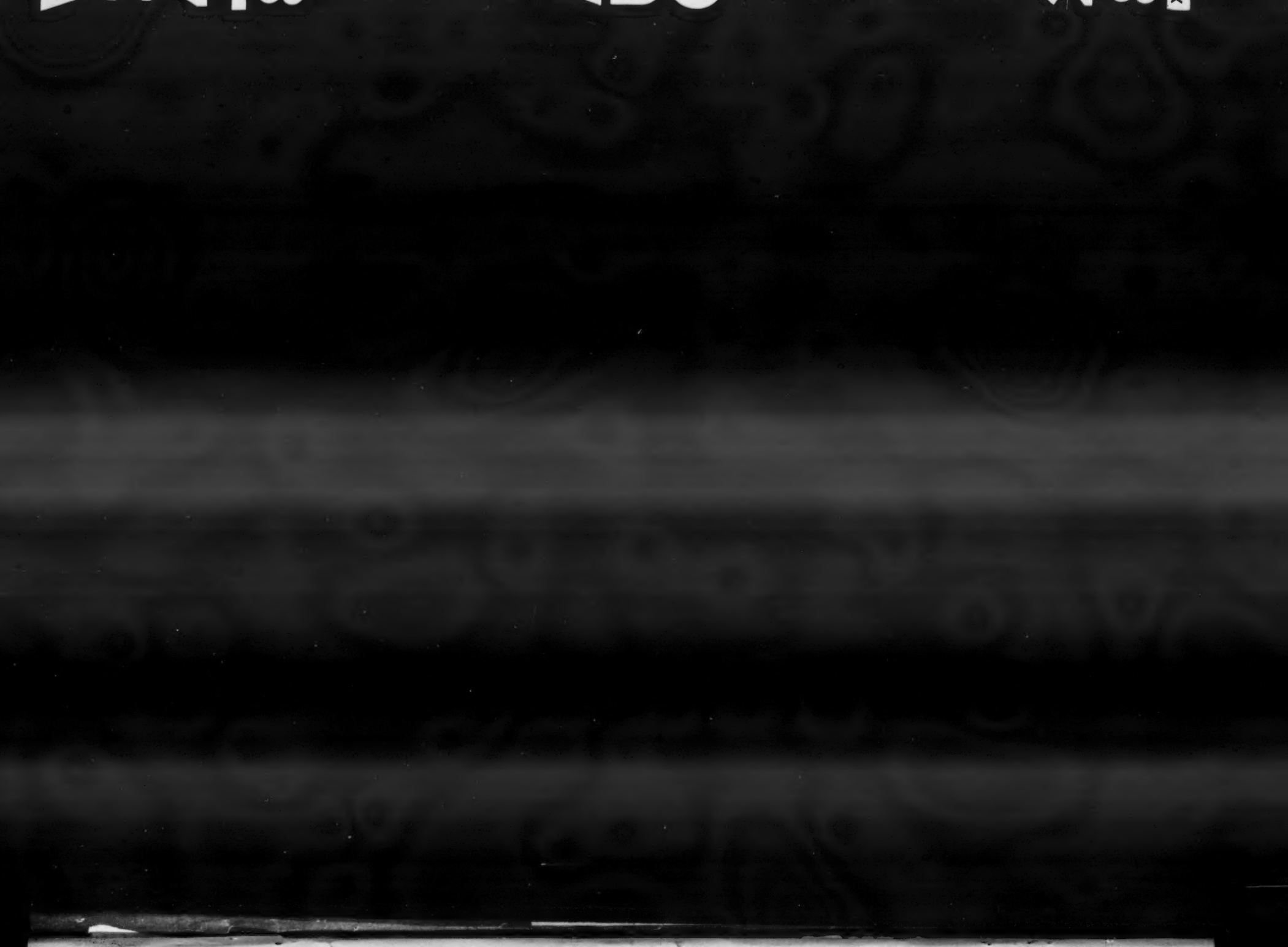
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